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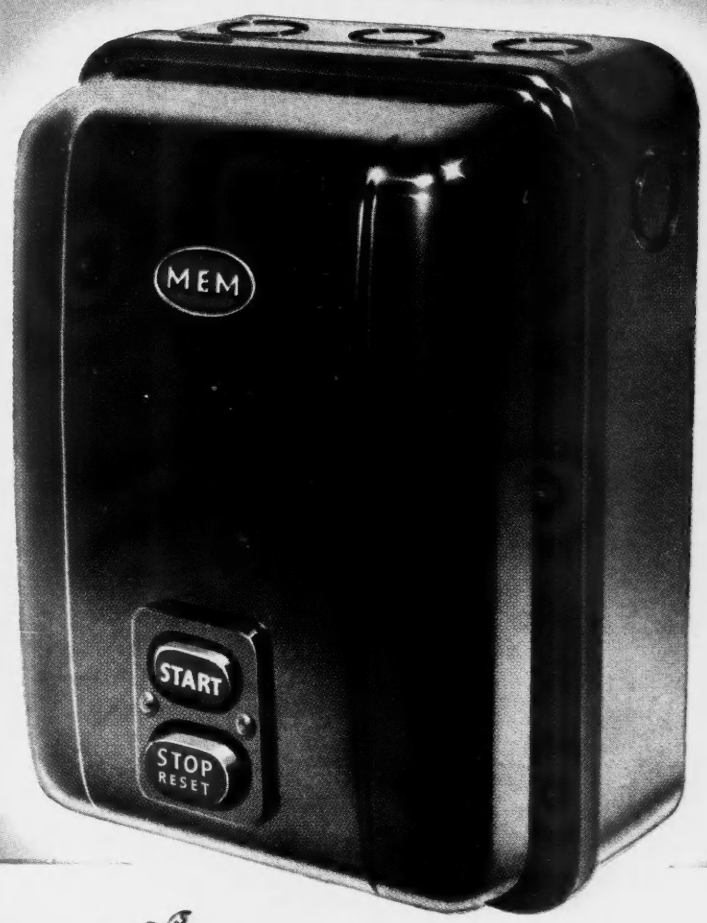

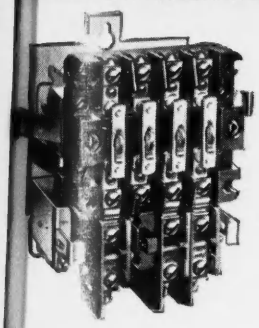

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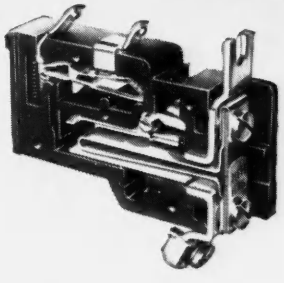

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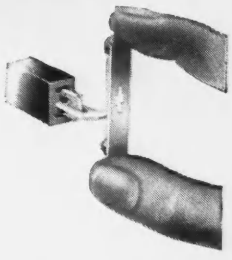

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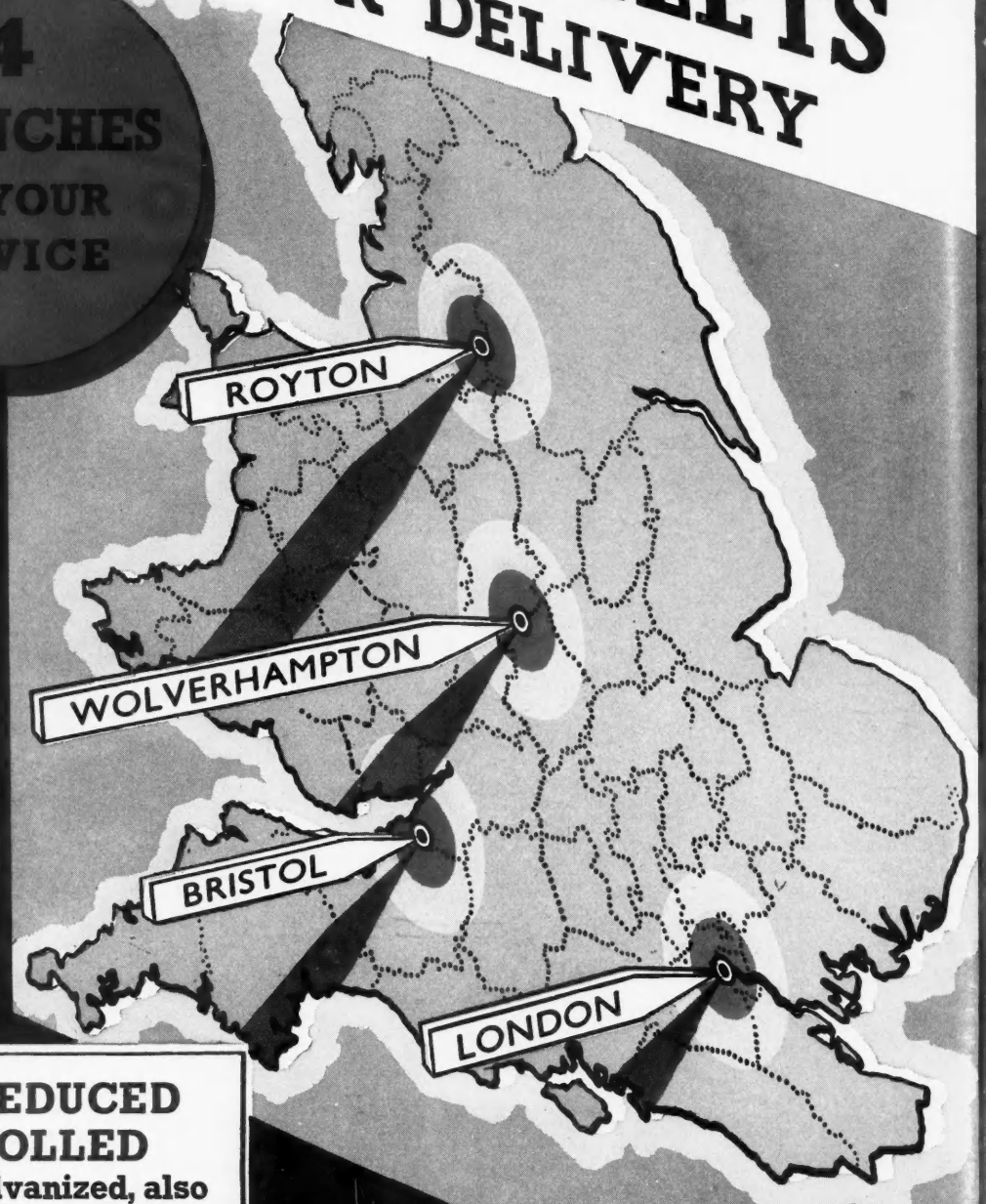

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7 DECEMBER 1956

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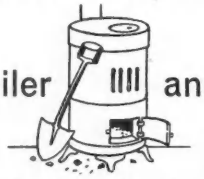
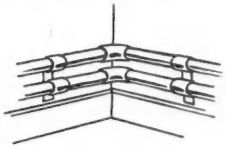
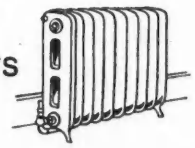
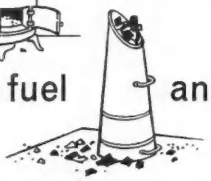
of a boiler  and pipes  and radiators 

and dirty fuel  and dusty ashes when all they

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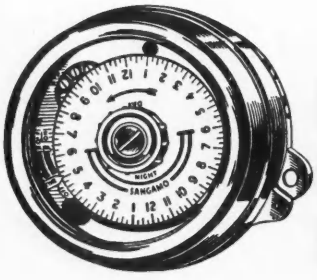

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ELECTRICAL REVIEW

7 December 1956 Vol. 159 No. 23 Established 1872

Electricity Reorganisation

ONE of the main effects of the 1947 Electricity Act was to separate electricity generation (with main transmission) from distribution but it also bracketed generation with general control of the electricity industry, putting both into the hands of the British (now Central) Electricity Authority. The Herbert Committee of Inquiry into the Electricity Supply Industry considered this arrangement to be unsatisfactory for a number of reasons: for instance, it was thought that it militated against the expeditious design and construction of power stations because of the vast amount of committee work which had grown up round the system; also the Area Boards complained that they were unduly interfered with in the conduct of their affairs.

As a result of its studies the Herbert Committee recommended the separation of general administrative functions and generation: the first to be exercised by a new "Central Authority," of an independent character, and the second to be taken over by a "Central Electricity Generation Board." In the Electricity Bill placed before the House of Commons last week the idea of a separate generating board has been accepted but the proposed Electricity Council represents a much looser control than that envisaged by the Herbert Committee. In one sense it will go farther in the direction of decentralisation than even the Committee suggested, for the new Council will be able only to advise, not direct, the Area Boards. On the other hand it will strengthen the Minister of Fuel and Power's hold on the industry, for good or ill, by eliminating the influence which a strong Central Authority has been able to bring to bear. For one thing the Minister secures absolute freedom in the appointment of all Board members.

The Electricity Council's positive functions will relate to "the performance of such services as are best performed in common"; the raising of capital and the undertaking of major research projects are quoted as examples in the White Paper accompanying the Bill. Apart from this, its duties will be "to promote and assist the efficient operation of the Generating and Area Boards as parts of a co-ordinated system of electricity supply." It is seen as "a new body in which both the generating and distributing sides of the industry can solve their common problems under independent guidance."

These are the principal features of the Bill but the Herbert Committee's recommendations dealt extensively with matters which were "internal" rather than subjects for legislation. Some may be considered of "national interest," in which case the Minister can issue directions, but most will be settled by the Boards themselves—and possibly in different ways. Tariffs for instance may be affected by the new stipulation that each Board shall be required to balance its revenue and expenditure "taking one

year with another." Although tariffs are to be fixed after consultation with the Central Council, that body will have no powers of enforcement.

It remains to be seen whether the new dispensation will be an improvement on the old. Comparatively greater independence of the Boards will put them on their mettle but the possibly greater " public accountability," represented by the reserving of more power by the Minister, may be an uncomfortable spectre in the background. The present electricity service, though not perfect, is by no means bad. The new legislation will be justified only if it results in recognisable benefits to industry and the public.

INCIDENTAL POINTS

Among the less prominent provisions of the new Electricity Bill is one empowering the new Generating Board to supply electricity in bulk to " any person or body of persons carrying on an electricity undertaking outside Great Britain, for distribution by that person or body outside Great Britain." This is evidently designed to legalise the projected exchange of electricity with France by the cross-Channel cable and rather implies that such powers did not exist before.

Clause 2 (3) (*a*) of the 1947 Act empowered the Central Electricity Authority to manufacture electrical plant and fittings. In a corresponding clause in the new Bill the Generating Board is given powers to manufacture electrical plant only and it is expressly precluded from manufacturing, selling, hiring or otherwise supplying electrical fittings. Incidentally, the C.E.A. soon disposed of the small manufacturing businesses which it acquired on vesting day along with the supply undertakings.

It is perhaps startling to find a clause in the new Bill empowering Area Boards to generate electricity (with the Minister's consent) if they consider this to be expedient. It is understood that the principal reason for the insertion of this clause was the possibility that a Board might wish to operate an exhaust-steam district-heating system. Possibly in the committee stage the wording of the clause will be made more specific.

INSTALLATION INSPECTION

The announcement by the National Inspection Council for Electrical Installation Contracting of the appointment of a chief technical officer (Mr. E. J. Sutton) marks the real beginning of the Council's activities. Contractors are being enrolled and the next step is the selection of inspectors from the many applicants for these positions. One of the weaknesses of the National Register of Electrical Installation Contractors (now being wound up) was that it was able to employ only two inspectors. Thus the risk taken by any contractors on the Register who did not live up to their undertakings was very small.

We should think that it would not be too much to have an inspector for each of the Electricity Areas (including that of the South of Scotland Board) so that every firm or individual on the Roll of Approved Contractors could expect a visit, say, annually or biennially—at any time. Reputable contractors may not need such surveillance but inspection must apply to all impartially. No doubt flagrant breaches of the code will be reported by the Electricity Boards when they occur and delinquents will be given special attention.

550 MW GENERATING SET

The news that the Central Electricity Authority is planning to install, as part of its programme of power station construction for 1962, a turbo-generator set with a capacity as large as 550 MW (reported on page 1046) is, to say the least, rather startling. Startling, because for the last couple of years or so we have heard so much about the sets for the High Marnham power station which will be rated at " only " 200 MW.

It is not revealed where this new 550 MW set will be installed nor whether it is to be installed in a new station or is to constitute an extension to an existing station; this knowledge would greatly increase the interest of the news to hand. Associated with this outstanding development in the same programme is the construction of 275 MW sets.

What is a little more surprising, however, is the announcement that the steam conditions of 2,300 lb/sq in and 1,050 deg F will be the same for both the 550 MW and 275 MW sets. These conditions, we believe, are much the same as those adopted for the new High Marnham 200 MW sets and the development does not appear to fall in line with what has been happening over the past decade or so when the increase in set capacity seems to have automatically brought with it an increase in steaming conditions.

LIGHTING RESEARCH

The first practical application of electricity on any scale was for lighting and to-day it is still a subject of major importance in the electrical industry. During this century many improved light sources have been developed and put into production and although a high degree of efficiency has been achieved, those concerned are by no means satisfied and vigorous programmes of research and development are being conducted in the laboratories of lighting equipment manufacturers. We visited one of these laboratories last week and an account of some of what we saw is published on pp. 1062-3. There is no doubt in our minds that the manufacturers are doing a very good job and making steady progress in the improvement of lighting equipment, fittings and light sources, but full advantage of recent developments is not necessarily being taken by others.

The manufacturers and some engineers have both the ability and the means of designing good lighting installations and, in fact, there are many excellent examples all over the country. But many lighting installations are unimaginative, inefficient, and totally inadequate for the purpose for which they were intended. This applies particularly to office lighting and may be largely due to the fact that there is no legislative control over such installations. It would undoubtedly be a good thing if there were much greater co-operation between architects and competent illuminating engineers to break away from the idea which exists in many quarters that any sort of fitting stuck in the centre of the ceiling will provide sufficient and satisfactory illumination for the occupants of the room, irrespective of their duties.

Industrial Influence on Public Electricity Supply

3. The Agricultural Industry

By R. H. M. BARKHAM, B.Sc.(Eng.), M.I.E.E.*

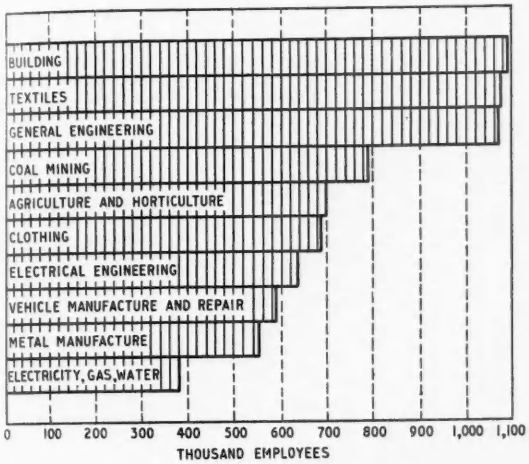


Fig. 1.—Analysis of employees in industry

IN this country there are only two indigenous major basic materials, coal and food, and our existence as a nation depends on making the maximum use of the little with which nature has provided us. While coal already needs to be supplemented by other sources of fuel, and by the next century may well play a relatively unimportant part as a source of power, food will need to be produced in ever-increasing quantities to meet the needs of the growing population, and the additional requirements over and above what can be produced from this island must be kept to a minimum because of the heavy price that must be paid in manufactured goods and the services that we provide to the rest of the world. An analysis of employees engaged by the various industries is given in Fig. 1 which shows that agriculture is still one of the largest industries in the country.

We in the electricity supply industry generally look on the work that we are performing in the rural areas as influencing farming methods and country life, but on further thought one would expect the interaction of two major industries to influence each other. There is little doubt that agriculture has had a far-reaching effect on the electricity supply industry. As is well known d.c. electricity generation and distribution inherently limited the areas over which a supply could be given, and it was the development of a.c. generation and transmission which opened the door to widespread distribution. The uneconomic nature of rural electrification which was, of course, anticipated did not encourage the local authorities to assume a financial responsibility for areas not inhabited by their own ratepayers. While a few local authorities did eventually obtain the necessary statutory powers to extend electricity into the neighbouring country districts, it was the private companies which undertook the responsibility for most of the rural electrification of the country.

The approach to the problem, whether by local authorities or private companies, was primarily the same even though the former had the cushion of the urban undertaking to help balance the poor return that the electricity supply in the rural areas would bring. No one expected that extensions in such sparsely populated areas could show a profit, at least for some time to come, and the cheapest possible form of construction was devised to continue very largely the known applications of electricity which had been developed in the towns. The country dwellers by and large did not look to electricity to provide them with more than was already available to their town cousins, and thought in terms of lighting, cooking, water heating, the radio and the obvious application of motors to drive such farm machinery as was available. It was at this stage in the 1930s that the electricity supply industry started, perhaps unconsciously, to develop a different outlook, which was shown in two ways.

In the first place the extension into the rural areas

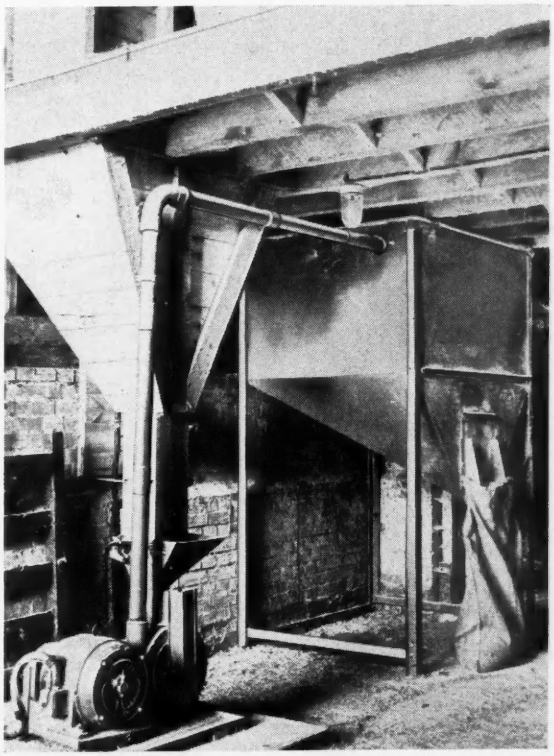


Fig. 2.—Three h.p. hammer mill with automatic feed and meal storage bin

* Chief Commercial Officer, Eastern Electricity Board.

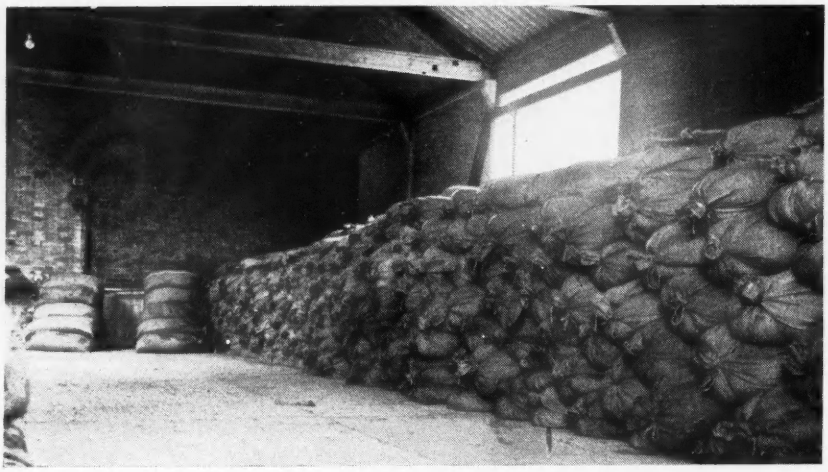


Fig. 3.—Sacks of grain forming warm air tunnel

came to be regarded as something which should not stand or fall only on economic grounds, but was necessarily a challenge to be met by the industry because, in present-day language, there was a social need for electricity in the countryside as a factor in the maintenance of a balanced community. The amenities of the town had for a long time caused a drift of population away from the countryside, and electricity seemed to be one of the facilities which would encourage people to remain on the land because of the almost complete urban standard of comfort that it could give.

Secondly, the need to make the maximum use of the capital investment in the rural areas meant seeking out as many new applications of electricity as possible, and the initiative in devising and developing these new applications seemed to rest with the electricity supply industry. In fact, it was the staff of the industry who began to look at their work from the point of view of the countryman, and they found and developed several new devices to the mutual benefit of agriculture and the electricity industry.

The hammer mill is a typical example. It was originally driven by the tractor, the main power source the farmer had available. The chief use of a tractor is on the land, and it was therefore desirable to obtain the maximum output in the minimum time from the mill while coupled to the tractor, particularly as a man had to stand by. The mill was matched to a large power source. An example of a 3 h.p. hammer mill with automatic feed and meal storage bin is shown in Fig. 2. When electricity was first installed, the matching took place in the reverse direction, and a large motor was installed to drive the mill. Obviously, the heavy load and low load factor were the least desirable characteristics. The Electrical Research Association, in co-operation with the staff of the electricity supply industry, set to work to produce a hammer mill which, in addition to a small motor, would have an automatic feed and thus not need a man standing by. Prototypes were developed, tried out on farms, and when the designs were finally approved manufacturers were encouraged to produce them. There is now keen competition between the manufacturers to satisfy this market.

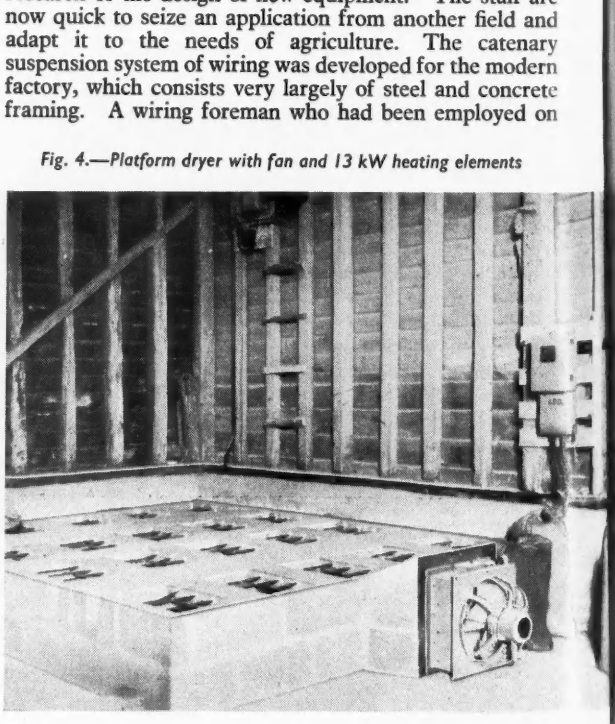
Another example is the adaptation of the platform dryer to electrical operation. The National Institute of Agricultural Engineering developed an insack platform dryer for grain with an oil-fired unit. The capacity of the unit was related to the heat developed by the oil burners, a purely arbitrary correlation when it came to the needs of a farmer (see Figs. 3 and 4). Again the staff of the industry and E.R.A. set to work to develop a small loaded high load factor dryer, and the "tailor-made" self-contained unit has resulted. The manufacturers became aware of this development through the normal co-operation with E.R.A., and were quick to produce the range of dryers now available which, in addition to having the desired electrical loading characteristics, are just as satisfactory in dealing with the crop to be dried.

Drying in ventilated bins is a method which owes its inception to the staff of the electricity supply industry. A farmer made the first approach with the idea, and the local electricity staff helped him to build the first unit which operated in this country. This farmer had associations with the National Institute of Agricultural Engineering who were working on similar lines and, as a result, it has become widespread in its adoption. Experiments are still continuing by the Electricity Boards' staff and the possibilities of introducing humidity control, and drying by cold air, promise the best advantages to both the Boards' distribution mains and the farmer (Figs. 5 and 6). Hay drying is a process on which a lot of work has been done, and is still being done, by the staffs of the Electricity Boards.

Catenary Suspension Wiring

Not all of the applications of electricity result from research or the design of new equipment. The staff are now quick to seize an application from another field and adapt it to the needs of agriculture. The catenary suspension system of wiring was developed for the modern factory, which consists very largely of steel and concrete framing. A wiring foreman who had been employed on

Fig. 4.—Platform dryer with fan and 13 kW heating elements



this type of work thought, when engaged on the next farming installation, that this system had applications on the farm, because modern farm buildings are similar to factories in that they consist of steel or concrete frames with the same difficulty in fixing an installation to the walls and joists. The catenary suspension system was successfully applied (Fig. 7), and it also promises well for wiring between scattered buildings, which is the normal arrangement of a farm.

The hot block sterilising equipment was primarily developed by the manufacturers to deal with load shedding and power cuts, but its desirable electrical characteristics were seen by the Boards to be worth encouraging, and as a result the direct heating heavily loaded sterilisers have largely disappeared.

The greenhouse load has been primarily one of heating with a substantial on-peak component, but there is a summer load to be developed in greenhouses, and the recent application of a thermostatically controlled fan, as a means of securing temperature control in the greenhouse during the summer, is one which will again give a long-sought after automatic control to the grower, and yet benefit the load factor of the Boards.

It is gratifying that a substantial portion of the installation of farm machinery is being carried out by the Electricity Boards; this is a recognition by the agricultural community of the pioneering work which they have carried out.

Attractive Tariffs

Another way in which the approach to the job has been conditioned by the needs of the countryman has been in the tariffs and charges for connecting the supply to country properties. In at least one large rural area in the early days, an assessment was taken of the amount that the farm worker spent each week on candles, paraffin and other fuel; generally speaking, out of a total wage of 30s he was spending approximately 1s a week on these items.

The tariff that was subsequently introduced was a fixed charge of 15s per quarter, which included a free allowance of units at an equivalent price of 6d/kWh, representing a total annual allowance of 120 kWh. This allowance covered all his normal requirements for lighting, an electric iron, and a radio set, and coupled with this was an assisted wiring scheme giving him three free lights and a socket outlet.

The country worker was therefore encouraged to install electricity at substantially no extra cost over and above what he was already paying for similar services. This approach may be said to have ignored the economics from the electricity supply companies' point of view, and was more akin to charging what the traffic would bear than relating tariffs to costs on the lines subsequently recommended by both the Ridley and Herbert Committees' Reports.

Again, while connection charges in some cases appeared to be comparatively heavy, where they took the form of capital contributions or guaranteed revenues they were generally based on something like 20 per cent return gross revenue to capital, which is about half what the industry needs to balance its budget. There was little evidence of any desire to charge any consumer with the whole cost of connecting his premises to the nearest point of supply on the lines envisaged in the 1899 Clauses Act where only the first 60ft on the public highway was to be provided by the electricity undertaking.

The policy of charging for connection and for electricity as subsequently developed by the Electricity Boards has been even more generous, so that now there is the same

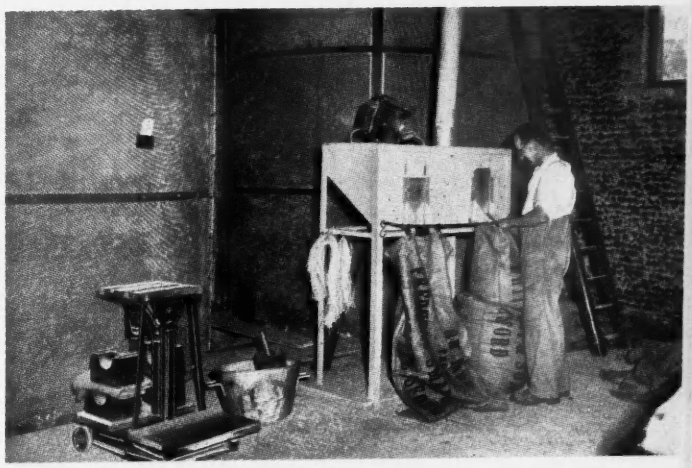


Fig. 5.—Radially ventilated perforated bin grain storage installation

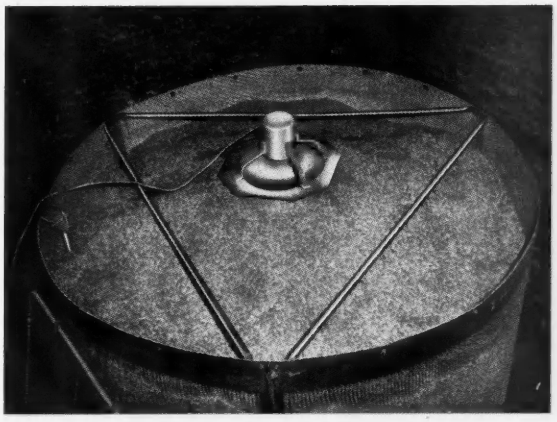
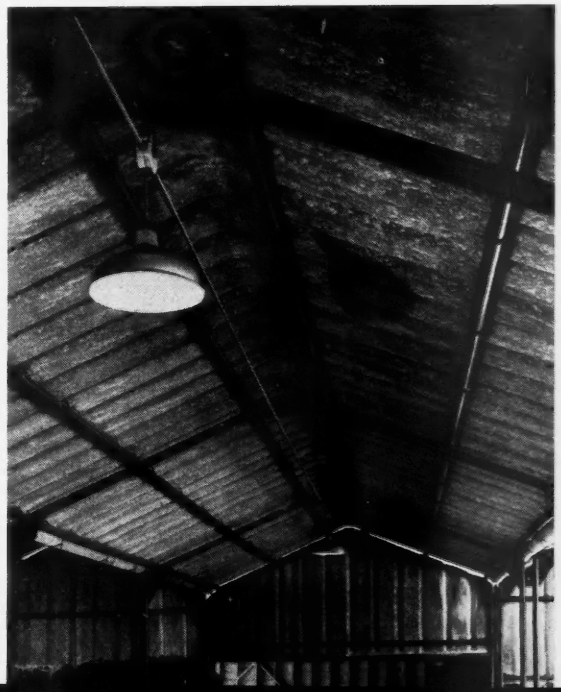


Fig. 6.—Experimental radially ventilated bin using cold air

Fig. 7.—Catenary suspended distribution in steel framed barn



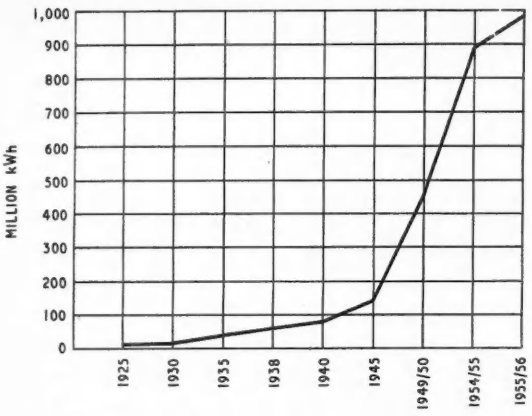


Fig. 8.—Electricity supplied to farms in England and Wales

tariff for country dwellers and urban dwellers, and the proportion of the total capital cost borne by the Board is greater. In fact, many properties for which a charge would have been made previously are now connected free of cost to the occupier. All this indicates the predisposition of the Boards, reinforced by a specific duty in the 1947 Act, to regard supplies of electricity to the rural areas in a more favourable light than the true economics would justify. Fig. 8 indicates the growth of rural electricity supply in this country during the past thirty years.

The use of overhead mains originally implied a lower standard of reliability and, in fact, more interruptions on overhead mains systems than on cable are still experienced. The greater use of electricity in the rural areas makes an increasing standard of reliability a necessity; so much so that when notice to shut down a line for maintenance or other work is given, the volume of complaints about the inconvenience of the time, if during the day, can be just as great in country districts as elsewhere. The mains engineer is coming to the conclusion that the only safe times when he can open a switch are between midnight and dawn.

One example of a real loss in food production from a relatively short shut-down is egg incubation and chick rearing, and the large hatcheries are well advised to have an alternative supply available. The smaller consumers can purchase inexpensive "no volt" alarms to draw attention to an involuntary shut-down, so that other means of providing heat can be substituted.

Another feature which very much affects the carrying capacity and the reliability of overhead mains is the greater spread of industry into the country areas. Shortage of labour and shortage of water are two factors that are driving industrial development away from the recognised industrial areas, and it is now quite common to find workshops, some of which are developing into quite substantial factories, in isolated spots. Lines erected originally to the early conception of the needs of the country dwellers are now proving far from adequate, and a network more in line with urban standards, from the point of view of conductor sizes and switchgear facilities, is becoming more and more necessary. Perhaps the supply industry is being hoist with its own petard, because so successfully has the load in the rural areas been developed that a greatly increased volume of investment is now necessary to cope with it.

The man-power employed in agriculture is falling continually, but at the same time the farmer is expected to increase the productivity of his farm. That he is succeeding is due to the greater mechanisation that is taking place (see Figs. 9 to 12), but even so, so alive to the possibilities of electrical applications has the supply industry become, that a very real complaint is that the farmer is slow to adopt all the advantages which are available to him; in fact, the first entry to the farmhouse is often via the television set and the kitchen, and possibly it would be more profitable to cultivate the farmer's wife than the farmer. The agricultural community is very conservative in its outlook, and the main task of the commercial staff is breaking down the reluctance to adopt new ideas.

The decay of country living is being arrested by a remarkable growth of communal activity among the rural dwellers, not only by such activities as Women's Institutes, drama groups, amateur building of village halls and the like, but a resurgence of interest in rural industries and crafts. Here the electricity industry makes a valuable contribution, because many of the techniques developed in industry are now applied in a limited way in the local blacksmith's shop, the pottery, the carpenter's shop and the boat-building shed.

To sum up, the greatest influence of agriculture on the electricity supply industry has been in the outlook on life which it has engendered among the staff; men who entered an industry which is based on an engineering operation have found themselves looking at their problems, not on a technical basis, but from the human viewpoint of the consumer. This surely is of value since the industry only exists to meet the needs of, and to serve, the consumer.

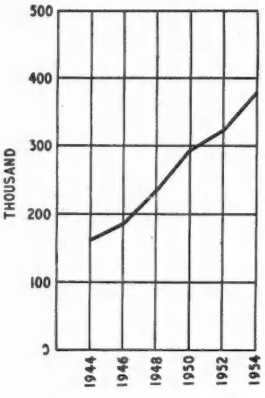


Fig. 9.—Agricultural tractors employed in Great Britain

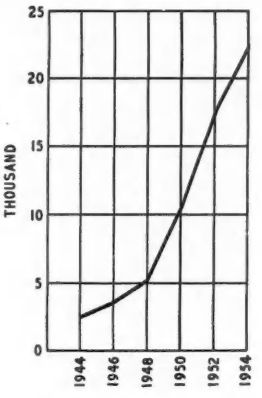


Fig. 10.—Combine harvesters employed in Great Britain

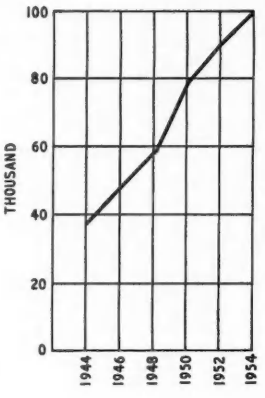


Fig. 11.—Milking machines employed in Great Britain

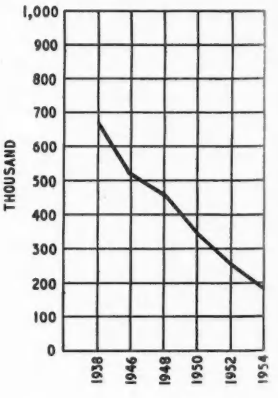


Fig. 12.—Horses employed for agriculture in Great Britain

Electricity Supply Reorganisation

Proposed New Legislation

LAST week the Minister of Fuel and Power (Mr. Aubrey Jones) placed before Parliament the Electricity Bill referred to in the Queen's Speech at the opening of the new session. It received a first reading; the second reading may be taken in two or three weeks' time. Simultaneously with the release of the text of the Bill (H.M. Stationery Office, 2s) a White Paper was published (Cmd. 27, 4d) reviewing the Government's proposals for the reorganisation of the electricity supply industry.

The White Paper refers to the report of the Herbert Committee of Inquiry into the Electricity Supply Industry which said that the organisation of the industry was capable of considerable improvement. In particular it was pointed out that the combination in the Central Electricity Authority of the functions of supervising the general policy of the industry and generating electricity in bulk had led to an excessive concentration of responsibility at the centre and placed an undue burden of day-to-day work upon the Authority's senior executives. The Government has accepted this view and thinks that a reorganisation in the light of the Committee's findings is made all the more necessary by the industry's new responsibility for the nuclear power programme. Accordingly, it has decided that the generation and bulk supply of electricity shall be handed over to a new Central Electricity Generating Board and, it has been said, this Board would probably have representatives of the United Kingdom Atomic Energy Authority as part-time members on an interchange basis.

Principal Provisions of the Bill

1. Dissolves C.E.A. as from 1st April, 1958.
2. Establishes an Electricity Council and Central Electricity Generating Board.
3. Makes Area Boards responsible for balancing their individual accounts.
4. Gives generating powers to Area Boards when "expedient," with consent of Minister.
5. Strengthens Consultative Councils.

It is also agreed that the Area Boards shall be given greater autonomy and be required to balance their accounts individually. The Committee's recommendation that the Minister should not be obliged to consult the Central Electricity Authority or its successor in making appointments to Area Boards is also accepted.

Electricity Council's Duties

The Herbert Committee proposed that a new Central Authority should be set up, whose members should be independent of the Boards. While this body would not exercise any executive functions it would have wide powers of supervision. This proposal has not been agreed to by the Government. Instead, it aims at setting up an Electricity Council, consisting of a chairman and one or two deputy chairmen appointed directly by the Minister, the other members being the chairman and another representative of the Generating Board and the twelve Area Board chairmen. It will be the duty of the Council to promote and assist the efficient operation of the Generating and Area Boards as parts of a co-ordinated system of electricity supply; to act as an agent for the carrying out of such services as are best performed in common, e.g. major research projects and the raising of finance; and to advise the Minister on questions affecting the industry.

Adopting another recommendation of the Herbert Committee, the Government intends that the Boards' capital programmes shall be more seriously scrutinised and will require the Boards, although they will bear the ultimate responsibility for the proposals they place before the Minister, to submit their plans to the Council first.

The most important functions of the Minister will be to appoint the chairman and deputy chairmen of the Electricity Council and the members of the Boards; to approve each Board's capital development plans and the industry's research programme; and to approve, in consultation with the Treasury, the Boards' borrowing requirements, having regard to the development programmes submitted by the industry. The Minister will also have the power to issue general directions to the Council and Boards if he considers them necessary in the national interest.

Recommendations by the Herbert Committee that the organisation and powers of the Consultative Councils should be strengthened are also accepted by the Government.

While the general terms of the new legislation will not apply to Scotland, certain changes affecting the common code applying to both countries will also cover the Scottish Boards, e.g. those relating to Consultative Councils and terms and conditions of employment.

Summary of the Bill

The first clause of the Bill provides for the dissolution of the Central Electricity Authority on 1st April, 1958 (the "vesting date") and Clause 2 establishes the Central Electricity Generating Board to take over the functions of the C.E.A. relating to the generation or "acquisition" of electricity, the provision of bulk supplies to the Area Boards and the provision of electricity to railways. The Generating Board is empowered to provide bulk supplies to either of the Scottish Electricity Boards; "for any person or body of persons carrying on an electricity undertaking outside Great Britain for distribution by that person or body outside Great Britain"; or for any other person or body under the authorisation of the Minister.

Power is given to the Generating Board in Clause 2 (7) to manufacture electrical plant; to sell and supply electrical plant and install, repair, maintain or remove electrical plant and fittings; and "to carry on all such other activities as it may appear to the Generating Board to be requisite, advantageous or convenient for them to carry on for or in connection with their functions under the preceding provisions of this section or with a view to making the

best use of any assets vested in them." The Board may not manufacture plant for export or manufacture, sell or supply electrical fittings.

Clause 3 establishes an Electricity Council to function as from the vesting date. The Minister will appoint the chairman and one or two deputy chairmen; the members will be the chairman and another member of the Generating Board and the chairmen of the twelve Area Boards.

It will be the duty of the Council to advise the Minister on questions affecting the electricity supply industry and related matters and to promote and assist the maintenance and development by the Electricity Boards of an efficient, co-ordinated and economical system of electricity supply. The Council can, if authorised by all the Boards or any group of them, perform services for or act on behalf of the Boards concerned in matters of common interest to them. Provisions in the 1947 Act relating to incorporation, remuneration, allowances and pensions of members of Electricity Boards are applied to the Electricity Council.

Consultative Councils

Section 7 of the 1947 Act, dealing with Consultative Councils, is amended and added to by the First Schedule to the new Bill. This alters the representation of local authorities on a Council from " not less than one-half nor more than three-fifths " to " not less than two-fifths nor more than three-fifths " and in appointing such a representative the Minister is required to have " particular regard to his ability to exercise a wide and impartial judgment on the matters to be dealt with by the Council generally."

To the duties of Consultative Councils are added the consideration of any matter affecting the variation of any bulk supply tariffs applying to their areas whether referred to them by consumers or by the Generating Board. The Area Boards concerned, or the Generating Board, shall consider these references, and the Consultative Council may thereafter make representations to the Electricity Council on these matters. Where it appears that a defect is disclosed in the system of the Board in question the Electricity Council may give the Board advice on remedying the defect. After consultation with the Electricity Council a Consultative Council may make representations to the Minister who may give directions for remedying the defect.

Provision is also made whereby a person who has made representations to a Consultative Council and is informed that the Council thinks that it is not necessary to take action may approach the Electricity Council; that body may make representations to the Minister who if necessary will give directions to the Board. The allowances and remuneration of the Consultative Councils and their officers will be paid by the Electricity Council. Part II of the First Schedule sets out a new Section (7A) to be inserted in the 1947 Act prescribing the constitution, etc. of Consultative Councils in Scotland. The Second Schedule containing transitional provisions stipulates that chairmen or deputy chairmen of Consultative Councils appointed before the vesting date shall continue in office until their periods of appointment end.

Generation by Area Boards

Clause 5 empowers the Minister to approve the generation of electricity by an Area Board if the Board considers it expedient to do so.

Clause 6 places upon the Electricity Council the duty of settling, from time to time, a general programme of research into matters affecting the functions of Area Boards, the Generating Board or the Council itself and to secure the execution of this programme. The Council may conduct research itself or make arrangements for the conduct of the research with any other person, including any of the Electricity Boards. Any of the Boards may conduct research which is not in the general programme.

Under Clause 7 the Minister, after consulting the party concerned, may give such directions of a general character to the Electricity Council or Boards as may appear to him to be requisite in the national interest. He may also give directions, after consultation with the Electricity Council, as to the use or disposal of any assets invested in a Board which are not connected with the generation or distribution of electricity.

Each Electricity Board is required to act according to a general programme, settled by the Board after consultation with the Electricity Council and approved by the Minister, of such measures of reorganisation or development as involve substantial capital outlay.

Provision is made for the furnishing by the Electricity Boards of reports, accounts, etc., to the Electricity Council or the Minister and by the Council to the Minister.

Clause 8 relates to the provision of annual reports by the various bodies concerned.

Machinery for settling terms and conditions of employment is covered by Clause 9, Section (1) (*a*) of which provides for joint consultations by the Electricity Council and the Scottish Electricity Boards with " appropriate organisations."

Financial Provisions

It is laid down in Clause 10 that the Generating Board and each Area Board shall secure that its revenues are not less than sufficient to meet its outgoings " taking one year with another."

Clause 11 (1) replaces sub-section (1) of Section 37 of the 1947 Act. It provides that the bulk supply tariffs of the Generating Board shall be fixed after consultation with the Electricity Council, and differences in charges to Area Boards shall be related to the cost of supplying those Boards. Area Boards' charges for electricity supplied to railways are to be fixed in consultation with the Electricity Council.

Clause 12 enables the Council and Boards, with the consent of the Minister and approval of the Treasury, to borrow temporarily, by way of overdraft or otherwise, for meeting their obligations or performing their functions. It also empowers the Electricity Council (with approval) to borrow money by the issue of British Electricity Stock and stipulates that the amount of stock outstanding (excluding compensation stock) together with Exchequer advances and temporary loans, may not exceed £1,400 million. It is provided, however, that this will not prevent the Electricity Council from borrowing in excess of that sum for the purpose of redeeming stock or of repaying Exchequer advances made to the Central Electricity Authority. Nor will it prevent the Council or Boards from borrowing in excess of that sum for the repayment of temporary borrowings.

Clauses 13 and 14 empower the Electricity Council to create and issue stock and provide for Treasury guarantees.

Clause 15 directs that the Generating Board and Area Boards shall each submit periodical estimates of its capital requirements to the Electricity Council which will have to be satisfied that the expenditure is in accordance with the Board's approved programme. This clause also deals with the allocation of responsibility for interest, sinking fund payments, etc., in respect of stock issued.

A central guarantee fund to be established by the Electricity Council is provided for in Clause 16. This

will be used if the Council or Boards are temporarily unable to discharge their obligations in respect of borrowed moneys. It will be contributed by the Boards to a maximum extent of £4 million a year and it must not exceed a total of £20 million. Clause 17 provides for the establishment of reserve funds by the Boards. Contributions by the Boards to the expenses of the Electricity Council are covered by Clause 18.

The application of the surplus revenues of the Boards is dealt with in Clause 19 and Clause 20 of the Bill transfers responsibility for payment of compensation to local authorities from the Central Electricity Authority to the Boards.

Transfer of C.E.A. Undertaking

The transfer of the undertaking of the C.E.A. to the Electricity Council and the Generating Board is dealt with in Clauses 21 to 23. Clause 22 (4) provides for the continuance by the Council and Board of agreements made by the C.E.A., but Section (4) stipulates that "no right, liability or obligation under any agreement for the rendering by any person of services to the Central Authority as a member of that Authority shall be transferred to the Electricity Council or the Generating Board, except any liability in respect of remuneration earned or expenses incurred before the vesting date."

It is laid down in Clause 23 that the Minister, with the approval of the Treasury, shall require the Electricity Council to compensate for loss of office any person holding office as a member of the Central Electricity Authority "who suffers loss of employment or loss or diminution of emoluments or pension rights or whose position is worsened in consequence of the dissolution of the Central Authority." Similar provision is made for compensation to officers of the Central Authority.

Clause 24 contains provisions relating to the certification of meters and stipulates, *inter alia*, that an Electricity Board shall be "guilty of an offence" if, on or after 1st July, 1958, it installs an electricity meter which has not been duly certified under the Schedule to the Electric Lighting (Clauses) Act, 1899. Clause 25 amends paragraph (*b*) of Section 10 of the Schedule to the 1899 Act (which restricts the placing of an electric line above ground) by inserting after "electric line" the words "other than a service line," and deleting the phrase "and except so much of any service line as is necessarily placed for the purpose of supply."

The rest of the Bill deals with administrative matters, transitional provisions (Second Schedule) and the amendment, adaptation and repeal of previous Acts (set out in the Third and Fourth Schedules). The Second Schedule includes provisions for the retention in office of Consultative Councils, the continuance for twelve months from the vesting date of bulk supply tariffs then in force, methods of dealing with liabilities in respect of British Electricity Stock and Exchequer advances, the winding-up and distribution among the Boards of the existing central reserve fund, the transfer of the C.E.A. undertaking to the Electricity Council and Generating Board, and continuance of pension rights.

Dimensional Equations

DIFFERENCES of opinion about dimensions formed the subject of a paper presented on 29th November by Professor R. O. Kapp (Kennedy & Donkin) before the Institution of Electrical Engineers. The use made of the theory of dimensions was, he submitted, purely algebraic, and some of the more extreme contemporary differences had been due to mistakes in elementary algebra. Apart from these, dimensional quantity appeared as a synonym of independent variable, although for convenience many independent variables might have to be excluded from dimensional equations. He showed that the difference between rationalised and unrationalised units depended on the value of the unit given to a quantity that appeared sometimes as an independent variable (though not always recognised as such), which he suggested might be called a "configuration measure."

Prof. E. Bradshaw (Manchester College of Technology) said that now at last agreement had been reached on a single and straightforward system of units some might regret the re-opening of controversial matters about which opinions would probably remain divided. It was important to emphasise two points. The first was that the marginal topics discussed in the paper did not affect the validity or usefulness of the m.k.s. system of units. The second was that for many people interest had been aroused by the use of the m.k.s. system and the use of substantially the same language had helped to focus attention on topics of philosophical obscurity. Because the everyday use of the m.k.s. system was simple and straightforward, however, discussion should not be discouraged on matters about which doubts were sincerely and strongly held. The author had made a good case for the admission of more dimensions but there would seem to be grounds for putting further aspirants for dimensional recognition in an order of precedence. None of them had the strength of the basic four.

Prof. H. Dingle (University College, London) said that his view of dimensions was so fundamentally different from Prof. Kapp's that he could not possibly make clear how they differed without first giving his own views, but there was no time for that. All he could do was to show clearly on points selected from the paper where he differed and hope that in this way the fundamental difference would reveal itself. He then went through a number of points and concluded by saying that no one knew what dimensions were because they did not exist in nature.

Prof. A. L. Cullen (Sheffield University) said he found the spirit of Prof. Kapp's paper much in accord with his own views about removing the mysticism that surrounded discussion on dimensions and making practical utility the keynote. The view that a ratio should be regarded as a dimensional quantity was, however, difficult to support.

Dr. F. T. Chapman pointed out that the theory of dimensions was concerned with the sizes of units and the relations between the sizes of different units. According to the author, this landed some people in algebraic difficulties but everyone knew the hardest branch of mathematics was arithmetical and the theory of dimensions was concerned with arithmetic and nothing else except a little common sense.

Mr. L. H. A. Carr emphasised that dimensions were man-made and one could do what one pleased with them. In dealing with the theory of dimensions one should consider what one was driving at. From the practical standpoint, one use was to enable something to be equated to a true expression. Next, the fundamental quantities

were given in such a manner that the resulting equation would be true in any consistent set of units used. In dealing with any quantity one should get the same dimensions whatever approach was made.

Mr. G. Burniston Brown (University College, London) said that one got into endless trouble unless one defined "dimensions," though it was hard to blame Prof. Kapp for not giving a definition since other authors had omitted to do so. No one would deny that measurements of length and time were different, though Prof. Dingle apparently thought the word "dimension" should be used for quantities which were different in their measurement, but it had nothing to do with the units. However, the main point was for writers to tell their readers what was their definition and it was inexcusable to use the word "facts" without saying what it meant.

Mr. L. L. Whyte said that electrical engineers might be more satisfied with a certain system of units but there were almost as many differences of opinion as ever in the philosophy and general theory of the subject. It was indicative of that possibility of variance that Prof. Kapp had not mentioned Bridgman's book on dimensions published in the mid-twenties which combined emphasis on the operational side with a lucid analysis of how dimensional methods were used.

Mr. D. Connelly said the author had suggested that the ratio S of strain was somewhat of an encumbrance in the dimensional equation and could be omitted. He himself would suggest that the only justification for omitting it was if one knew definitely of what it was the ratio. It frequently happened that one did not know of what a certain quantity was the ratio and in that case the quantity should be retained in the equation. A similar argument applied to permittivity and permeability.

Mr. C. J. Carpenter (Imperial College) said that the differences went deeper than would appear from the paper and the discussion. A year or two ago when he had been interested in electromagnetism he had wondered what all the fuss was about. Having read the paper and a number of others, he began to understand why there were such strong feelings about it.

Mr. G. Knott said his own feeling was that a great deal of nonsense had been talked and very little sense. As a physicist this was his approach to dimensions: first, one tried to build up a physical theory; in order to do so one had to start with certain fundamental functions and constants. One should, if possible, be economical in one's primary assumptions and concepts and so simplify the theory. The dimensional problem showed clearly the present confusion in physical theories. Once that was clarified the whole of the dimensional arguments would disappear automatically.

Mr. P. A. Newsom said he found some of the things that had been demonstrated very difficult to believe and he believed a mistake had been made. The mistake was that any set of quantities which started out as a physical equation and then was manhandled into a dimensional equation could not be so treated unless it included all the variables, all those quantities which could have some influence on the final result.

Nuclear Reactor Conference

AT a conference held at the Atomic Energy Research Establishment recently members of the staff of the United Kingdom Atomic Energy Authority described their work on advanced types of nuclear reactors to representatives of British industry. The purpose of the conference was to provide a general account of the developments in hand. Over one hundred British firms and electricity undertakings sent about two hundred delegates in response to an open invitation from the Atomic Energy Authority.

In opening the conference, Sir John Cockcroft, the director of the Research Group of the Authority, outlined the present state of the reactor research and development programme to the delegates, pointing out that the continually advancing knowledge of reactor technology would inevitably bring changes in emphasis and intention.

The papers presented were largely concerned with the later stages of the large scale power reactor programme outlined in the White Paper of February, 1955. In his introductory talk Sir John Cockcroft outlined the principal objectives of each stage of the reactor power programme. The objective of the first stage of the programme is to reduce the capital cost of gas-cooled reactors by increasing the efficiencies and the heat ratings of these reactors. Fuel elements to withstand higher temperatures are being developed. These present problems, which are mainly metallurgical, are being vigorously attacked. The aim of the second stage programme is to develop a nuclear reactor with appreciably lower capital costs than the gas-cooled reactor. To achieve this liquids may be used as heat transfer media. The fuel will be initially enriched with plutonium created in the first stage reactors, but after the initial charge it should prove possible to recycle the plutonium through the reactor. Mr. L. Rotherham read a paper on one of the possible second stage reactors, the sodium graphite reactor system. He said that the technical feasibility of this system was not in doubt, but a great deal of work remained to be done on the development of fuel elements, on the design of the heat transfer system and on protecting the graphite against the liquid sodium. The other system under study for this stage is the pressurised water reactor.

The third stage of the reactor research programme is concerned with the development of reactors with high conversion coefficients in which fuel costs are reduced to a low value. The high ratings of these reactors should also markedly reduce capital costs.

Dr. P. Fortescue gave an account of the work now in progress on the high temperature gas-cooled reactor. The aim of this system is to achieve really high temperatures of operation (700-800 deg C) by using an almost homogeneous type of fuel element in which the fuel and moderator are very closely packed together, possibly in ceramic type elements. In this way the heat transfer problem is eliminated

Mr. R. Hurst gave an account of the problems involved in the design of 100 MW homogeneous aqueous reactors. In this system some of the most difficult problems are associated with the continuous fuel processing techniques which might be used and with the handling of the blanket "slurries." Similar problems were described by Mr. J. Smith in a paper on the liquid metal fuelled reactor in which bismuth may be used as the solvent metal.

More development work has been done in the fast reactor field than for the other candidates for the third stage reactor. The present advanced stage of this programme was described by Mr. H. Cartwright. He emphasised that although the Dounreay plant will become "critical" in the first half of 1958, this marks only the beginning of an extensive experimental programme aimed at obtaining the nuclear, metallurgical and engineering data required to design a prototype fast power reactor. Although the engineering problems of design are considerable it is in the metallurgical field that most work needs to be done to be able to derive full advantage from a fast reactor system.

Harwell is investigating possible propulsion reactor systems in collaboration with the British Ship Building Research Association.

TOWER TESTING STATION

Adaptation of a Disused Quarry

IT has always been difficult to test masts and towers effectively because of the need to have a point of support for the rope at the same height as the structure when applying horizontal loads. Many tests are carried out to destruction, so the supports for the horizontal loads must be much stronger than the structure to which the load is applied. Further, it is usual to apply these loads in two directions horizontally at right angles, and a minimum of two strong towers of similar height to the one under test would be needed if the tests were carried out on level ground. The alternative is to use some natural feature which provides high ground in the immediate vicinity of the testing station, such as two cliffs at right angles or a quarry.

Such a quarry, the " Monkey Hole," was available at Wirksworth in Derbyshire and Stewarts & Lloyds, Ltd., have adapted it for use as a testing station. It is entered through a narrow cleft in the face of a limestone cliff, some 150ft high, the walls are nearly vertical and the floor is rectangular, some 100ft by 60ft.

The testing station is intended for use not only by Tubewrights, Ltd., a subsidiary company, in developing tubular structures, but also by other manufacturers of this class of structure.

A universal type of base has been constructed to accommodate a large variety of towers. Bolts can be screwed into sockets, which are flush with the concrete base, and the tower footings can then be picked up at the required point. Because of the high walls of the quarry, the tower is tested in virtually still air conditions, and loads equivalent to the wind loads can be applied without having to make allowance for the wind at the time of testing.

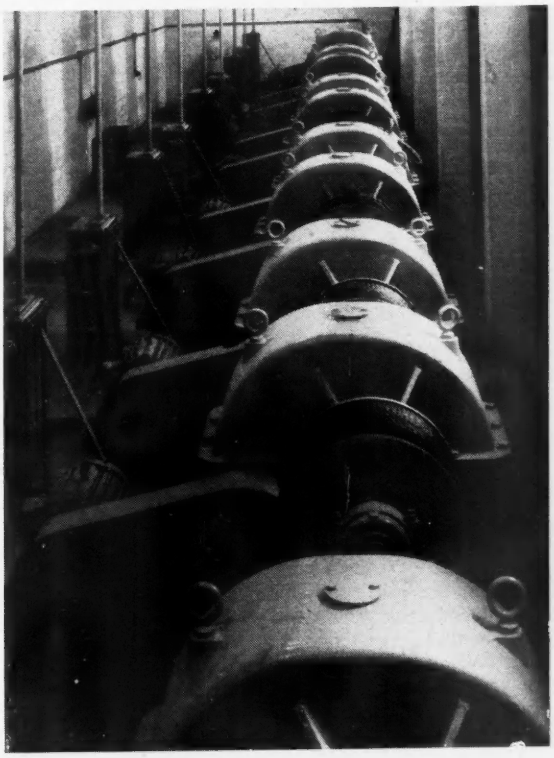
If a tower taller than 150ft is to be tested, ropes can be carried back to the rising ground around the quarry, or small structures erected to enable horizontal pulls to be applied up to 200ft above the quarry floor. Higher structures can be tested by dealing only with the top part, or by using half-scale models. The maximum width across the cross arms is limited to 50ft for towers up to 100ft high, but above this height the width can be considerably greater.

Loads up to 30 tons will be required for some tests, so the anchorage points had to be made very secure. The number of these points installed will increase as the various tests call for them, until finally there will be sufficient anchorage points to allow any structure to be picked up, if not exactly at the right level, then by a bridle spanning two anchors.

After a number of tests, the type of anchor selected was found capable of withstanding a direct pull of 94 tons, at which point the eye of the anchor broke, but there was no sign of the anchor itself being disturbed in its rock setting. In very few cases will the load be applied in such a way as to pull an anchor straight out of the rock. Normally, the anchors will carry a pulley converting the vertical load into a horizontal one, and the resultant pull

The " Monkey Hole " testing station with 275 kV transmission line tower in position

Some of the motor driven winches at the testing station



will be at about 45 deg or less to the line of the anchor.

The number of loading points and the maximum load at any one point were problems to which much consideration was given. It was eventually decided that twelve points would be needed, and that the load at any one point would not exceed 30 tons. This could best be obtained by a 5 ton pull, multiplied by the usual arrangement of multi-sheave blocks.

Special gears were provided to keep the rope speed very low—about 1¼ft per minute. Each of the twelve winches is powered by a 2 h.p. motor, running at 960 r.p.m. The main drum revolves at only 0·5 r.p.m. and the maximum load per winch is 5 tons, but many of the loads are usually less than this. One winch can be used to serve several points at the same time, while loads in excess of 30 tons can be obtained by coupling a number of winches and anchor points together.

The building which houses the winches and switchgear extends across the end wall, opposite the entrance; the control house is immediately above it. Sloping windows of armour plate glass are provided for observation and give a clear view of the test area. The winches are under push-button control, both at the winch itself and remotely in the control house above. During a test, the ropes run out from each winch, and then across the quarry floor and up to the appropriate loading point.

The main control desk has two wings, each of which serves six winches. Twelve dials show the load at each of twelve selected points, and ten dials show the deflection at ten points on the structure under test. In front of the main operator is the schedule of testing, a microphone through which he can give directions to different parts of the quarry and information as to the progress of the test, and an emergency " Stop Everything " button, which cuts off power to the winches, plus a single button to release all loads simultaneously.

Much thought was given to the problem of measuring the loads applied, and particularly to the accurate indication of these loads in the control house. It was decided to use a device called a " Pullmeter," which had recently been developed for other purposes in the Department of Research and Technical Development at Stewarts & Lloyds. This consists of a form of differential transformer capable of measuring a very small linear displacement which is, in fact, the elastic extension of the tubular outer casing of the device, occurring as the load is applied. The load is proportional to this extension and the instrument indicates in tons the applied load.

These weatherproof and robust " Pullmeters " have been made in a number of ranges, up to 2, 5, 10 or 30 tons. Each has an associated range unit which can be plugged into the control desk. The advantage of this system is that the load on any rope and on any winch is known throughout the test, so there is no danger of overloading or of snatch loads occurring.

The measurement of deflection is carried out by wires attached to the structure, the wires passing over pulleys and down into tubes standing on the quarry floor. Weights in the tubes keep the wires taut, and a slot in the tube allows rough indications of the deflection to be obtained against a scale at the side. Accurate deflection is measured by electrical indication of the rotation of the pulleys, and is shown on the dials in the control house. The sensitivity of the apparatus is such that a movement of 0·05in is detectable, and the accuracy of the readings is about ±0·1in.

Giant Turbo-Generators

Sets of 275 and 550 MW Capacity Included in C.E.A. Programme

THE Central Electricity Authority is planning to install, as part of its programme of power station construction for 1962, a turbo-generator of 550 MW capacity, which is very much larger than any now in operation and, as far as is known, is larger than any other unit at present projected anywhere in the world. The programme will also include a number of turbo-generators each of 275 MW capacity, which also represent an advance on the 200 MW sets which are at present the largest on order for power stations in this country.

The 550 MW machine will have an output greater than the output at present from any one of the Authority's existing power stations. It will be greater than the whole of the output from the Battersea station, London, and only at Barking in London and Hams Hall near Birmingham, where in each case there are three individual stations, is there a larger aggregate capacity of generating plant on any one site.

The decision to build a machine of this large capacity is the latest step in a development programme aimed at effecting reductions in the costs of generation by increasing the size of generating sets and boilers. Unfortunately, there is a factor outside the sphere of the electricity supply industry which places limits on the size to which generating sets can be developed, namely, the restriction on the maximum weight that can be transported by road. The maximum rating of generator which this limitation has made it practicable to contemplate commissioning in 1962 is 275 MW. This results in set sizes of 275 MW with a single-shaft tandem-compound arrangement of the turbine, or 550 MW with a two-shaft cross-compound arrangement, where two generators are employed.

Whilst the 550 MW unit promises even greater capital economy compared with the 200 MW machine than does the 275 MW unit, both have their proper application in the system, and both types have therefore been included in the programme. For both types, the initial steam conditions will be 2,300 lb/sq in and 1,050 deg F with one stage of reheat. These conditions are comparable with those adopted for the 200 MW units already in the programmes for 1959, 1960 and 1961.

At the same time, work continues on even more advanced machines for subsequent programmes. Although no justification has been found for an immediate advance in steam conditions, continuing developments in materials and techniques can be expected progressively to decrease the incremental costs of higher pressures and temperatures, so that in due course higher thermal efficiencies may be economically achievable. Application of higher steam conditions on a limited scale is therefore being investigated, with the object of stimulating progress in this respect.

VIEWS on the NEWS

By REFLECTOR

LONDON, in common with the rest of the country, is to have reduced bus services as a result of the hold-up in oil supplies from the Middle East. This has naturally raised again the question of whether the London Transport Executive is wise in persisting with its abandonment of trolley-buses in favour of diesel-engined vehicles. In extenuation the Executive pleads that the oil shortage will be of comparatively short duration and that, anyway, the extra amount of oil involved is insignificant. The first plea, I am afraid, is optimistic for our supplies seem to be destined to remain precarious, in which case any avoidable addition to consumption, however small, becomes significant. It is true that the 15,000 new diesel-engined buses on order by London Transport will not begin to go into service until the year after next but if anything this means that there is time to reconsider the position. The Central Electricity Authority can continue to provide the power or even more if it is required. What has been said about London is true of some provincial centres in which there are moves to get rid of the trolley-bus. There are also other considerations in favour of the trolley-bus, of course.

* * *

To the many of us who have been following the progress of the Olympic Games in Melbourne, the great performance last week of Mr. C. Brasher in winning the gold medal in the 3,000 metres steeplechase (the first gold medal to be won by Great Britain in track events since 1932) must have been particularly pleasing. It may not be generally known, however, that Mr. Brasher is the son of Mr. W. K. Brasher, secretary of the Institution of Electrical Engineers, and I feel sure that this knowledge will give added satisfaction to electrical men everywhere.

* * *

The *Manchester Guardian* quotes from the annual report of the inspector of the Doncaster Rural Council (Mr. A. Reynolds) on the reduction of smoke emission from collieries by the use of mechanical stoking. Mr. Reynolds said:—

> " Such changes show up the inefficiency of the human element in the hand feeding of boiler fires. As one stoker irately remarked to the manager of a works and myself when the emission of black smoke from the chimney was pointed out to him 'What the —— does it matter? Nobody lives up there.' "

* * *

The exceptionally large gathering at last week's luncheon of the Batti-Wallahs' Society to hear Mr. J. Eccles speak on his Russian visit was indicative of the great interest which is being taken in electricity supply development in the Soviet Union. Mr. Eccles' talk, however, was not so much concerned with electricity supply (although he did refer to some of the huge developments which are taking place in that country), as with life and conditions in Russia generally. I am sure that all who listened must have been astonished at the mass of information which he gathered in such a short visit of three weeks and, as Mr. R. H. Gummer, who proposed a vote of thanks to him, said, Mr. Eccles and his colleagues who formed the mission to Russia obtained a vast amount of information on the Russian electricity supply industry which will prove invaluable to this country. Batti-Wallahs will hear more about Russia at their next luncheon (on 30th January), for the speaker is to be Col. G. A. Tokarty, formerly of the Zukoff Academy, Moscow.

* * *

It was provided in Clause 8 of the Electricity (Supply) Act, 1919, that it should be the duty of every joint electricity authority constituted under the Act (only three were actually formed and they were not quite what the Act intended) " to provide and secure the provision of a cheap and abundant supply of electricity. . . ." From that time much play has been made with the phrase " cheap and abundant "—too often in a cynical manner. The new Electricity Bill is phrased a little more cautiously. It defines one of the duties of the proposed Electricity Council as

> " to promote and assist the maintenance and development by Electricity Boards in England and Wales of an efficient, co-ordinated and economical system of electricity supply."

* * *

Under the heading of " Power Without Wires," a writer in the *Daily Record and Mail* describes a radio set made by a French scientist, who, he says, by the use of transistors, operates it without the use of a mains supply or batteries. The writer then goes on to ask " Can we look forward now to electric cars, travelling without batteries, rails or overhead wires and simply sucking in their juice from a faraway power station? " He proceeds to answer his own question by saying " not very easily and not for a long time." I agree.

* * *

Ghosts are frequently associated with the Christmas season, but this was not so in the case of one that haunted a certain Mr. Bosanquet seventy years ago. According to the *Philosophical Magazine* of that time the " ghost " used to visit him mostly in the summer between the hours of nine and eleven in the morning and about six in the evening. It caused peculiar deflections of his mirror galvanometer, which were sudden and capricious, and frightened him so much that he ceased all work for a time. When he recovered his equanimity he traced the ghost as being due to the solar heat falling more or less directly on the instrument and causing hygroscopic changes in the silk fibre. Commenting on this, the *Electrical Review* (10th December, 1886) said, somewhat caustically, that " a little infusion of practical experience into this gentleman's laboratory would check these wild theoretical spirits."

INDUSTRY AND THE HOUSE

Government's New Electricity Supply Proposals

By A. M. F. PALMER, A.M.I.E.E., M.Inst.F., M.P.

THE new Electricity Bill has appeared surprisingly quickly after the announcement in the Queen's Speech that the Government proposed to reorganise the electricity supply industry. As I predicted in my last article, the terms of the Bill do not follow slavishly the Herbert Committee's recommendations, but show substantial variations in places.

The variation is particularly marked in the matter of the ultimate control of the industry. It will be remembered that the Herbert Committee suggested that the present Central Electricity Authority should be replaced by a new body which while " remoter " than the C.E.A. would still have considerable responsibilities in relation to the Area Boards and the proposed new generating executive, including development programmes, capital and revenue budgets, depreciation and reserve funds, research activities and so on. But the Bill rejects this proposal presumably as confusing control and courting the risk of initiative passing from the centre without going to the periphery.

Instead the Government plumps for full de-centralisation both for the Area Boards and for the Generation Board. Under the scheme now brought forward, the Boards—appointed by the Minister—will be fully responsible for everyday operation and finance, together with future development and capital plans. All central powers are to be exercised by the Minister himself, who will approve, in consultation with the Treasury, capital development schemes put to him by the industry, and will retain for himself the right to issue general directions to the Boards " in the national interest."

Constitution of Electricity Council

In order to see that differences between the Boards are ironed out before they reach him, the Bill provides for the Minister to be advised by an " Electricity Council " made up on a federal basis by the chairman and one other member of the Generation Board, together with the twelve chairmen of the Area Boards in England and Wales, all sitting under the supervision of their own independent chairman appointed by the Minister. At first glance it would seem that this new advisory council will be overweighted by distribution interests. However, our minds, when we think like this, are probably influenced by the background of the last ten years when every Area Board has had balanced against it a powerful generation division. Yet Clause 5 of the Bill, as at present worded, is still likely to be the cause of some concern.

Clause 5 states that if an Area Board thinks it " expedient " that it should generate electricity for its own purposes, then all it has to do is consult the Electricity Council and submit proposals to the Minister for his approval. On this basis it is at least conceivable that the situation might arise where all twelve Area Boards submitted schemes for producing their supplies, and with their own powerful representation on the Electricity Council to back them, put this up as a unanimously agreed scheme to the Minister. On the assumption that he could not easily reject such an overwhelming request, the Minister's approval would be followed by the removal of generating rights from the Generation Board, leaving it only with powers roughly akin to those of the old Central Electricity Board. Discreet inquiry has elicited the information that no such interpretation should be placed upon Clause 5. It seems that all the clause is intended to do is to give the Area Boards—in the light of local circumstances—the opportunity to make provision for district heating schemes. If this is really the case then the Bill should say so plainly.

Since it is highly probable that the measure, substantially in its present form, will reach the Statute Book (unless, of course, international events bring about the fall of the Government) then it would seem that the famous Central Electricity Authority, which with all its admitted defects has done such great work for the industry, will die on its tenth birthday for it is proposed that the new Act should take effect from 1st April, 1958.

Party Reaction

How is the House of Commons likely to react to the proposals? Government supporters will generally approve of the Bill because it will seem to them to enshrine the principle of genuine administrative de-centralisation together with direct Government financial responsibility. Honourable Members on all sides will probably welcome its useful secondary effect of enlarging the sphere of parliamentary accountability since the powers taken over by the Minister from the C.E.A. will give the opportunity for him to be questioned more closely on the way in which he is exercising them. There may be, however, extreme Conservative critics of nationalisation who will make discussions on the Bill an excuse to ride vigorously all their private hobby horses such as the sale of apparatus by Boards, staff concessions and other flighty mounts. The attitude of the Opposition would then become important because it may be called on, on occasion, to strengthen the Minister against his own back benchers.

Very seriously, I can say that in the event of another Labour Government it would be a thousand pities if continuity of growth and development of electricity supply was brought to a stop by the repeal of the new legislation if enacted by that time. If we can reach broad agreement at this stage it will be to everyone's advantage. Some Labour Members may argue, of course, that while there is no challenge in the Bill to the principle of nationalisation, nevertheless it breaks away from centralised planning; also, it may be contended that legislation is unnecessary since many Herbert Committee recommendations could be carried out without all the turmoil of a new Act of Parliament. On the other hand, there will be equally good socialists who will argue that since national ownership is not in question, then we should seize with both hands an honest attempt—if we are sure it is such—by a Conservative Government to improve, in the light of experience backed by impartial report, the effectiveness of a State industry. In any event, we can look forward to some interesting mornings " upstairs," reminiscent of 1947 to those who, like the writer, served on the Standing Committee which brought the 1947 Act to the Statute Book.

A matter which is a little related to the foregoing is the decision of the House to re-establish the Select Committee on Nationalised Industries: this time without the cramping terms of reference which prevented the earlier Committee from reaching a conclusion. The theory is that the new Committee will examine the reports and accounts of the nationalised industries without let or hindrance, subject to the good sense and caution of the Members appointed to serve. In the course of a short debate, Government spokesmen emphasised that should the Select Committee stray from the primrose path in a way either embarrassing to the Government or likely to act against the everyday efficiency of the industry, then the whole idea would be looked at again.

Mr. Harold Watkinson, the Minister of Transport, thought the Committee would work out very well indeed and provide a " reasonable forum " where Members could follow up their own points and where at the same time the nationalised industries could put their side of the case. Select Committees of the House of Commons, he thought, had always shown a high standard of " correct conduct in the public interest " and he did not think there was any real risk of those mild inquisitors over-reaching themselves. Without much conviction, the Opposition spoke against the Government's proposal not on the grounds that they were against greater parliamentary accountability, but rather that they did not like the method proposed to attain it. However, that will not prevent Labour Members being appointed to the Committee and playing their full part in its work.

PARLIAMENTARY REPORT

Select Committee on Nationalised Industries

The House of Commons approved a motion to set up a Select Committee to examine the reports and accounts of the nationalised industries. Mr. R. A. Butler, Lord Privy Seal, said the Government hoped that the new Committee would gradually create in the House a body of informed opinion about these industries and would not refrain from criticism when it was due, approaching the subject in a helpful and constructive spirit. It would produce reports from time to time which would be debated, thus bringing the affairs of the industries back into the main stream of parliamentary discussion, with the added advantage that the material would have been sifted beforehand. But the appointment of the Committee was an experiment which would have to be judged by its results and reconsidered if necessary in the light of experience.

There were certain subjects on which intervention by the Committee would be undesirable, such as the charges and fares of the Transport Tribunal, or wages and conditions of employment dealt with by collective bargaining arrangements. If the Committee did intervene the Government had the right to propose some alternative machinery. If this experiment worked the House might be able to build up the right machinery for associating Parliament with the nationalised industries.

Mr. James Callaghan, for the Opposition who opposed the motion because they did not think it the appropriate way of dealing with this problem, said that if there were members of the Committee who followed the lines often taken in the House, more harm than good would be done to the morale of these industries, especially among the operative and managerial grades. The Labour Party was still considering the problems of accountability, so they had no final conclusions to put forward. One of the ideas being considered was that there should be an efficiency audit team on the lines of the Herbert Committee who could " roam over the whole field of the nationalised industries."

Mr. J. Grimond, for the Liberal Party, said the first job of the Committee would be to see whether the Minister concerned was doing his job and whether the nationalised industries were well run. If the Committee came to the conclusion that the National Coal Board was not being well run, the first sanction would be for the House to try to sack the Minister of Fuel and Power. The Committee could give the House some idea whether the industries were being well run and that was about all it should attempt.

Mr. Shepherd said the Committee could not possibly do the task allotted to it. The House should stop tinkering with this problem and get down to some system of real parliamentary control. There was an immense amount of " buck-passing " between the Ministers and the chairmen of the industries. Undertakings could not be run on the basis that no one was sure who was really in control. To transfer these industries to parliamentary control would show clearly where the responsibility lay.

Mr. Ernest Davies, commenting on the view that industries would not be efficient with the Committee continually " looking over their shoulders," said that this should not be a danger as long as it was limited. After all, the Civil Service was accountable to the House and it did not lack initiative.

Mr. Harold Watkinson, Minister of Transport, replying to the debate, said the Opposition had no constructive alternative to the Government's proposal which was a second try, following the discovery in the first Select Committee that such a Committee could not be made to work under rigid terms of reference. It was not wrong that the nationalised industries should have someone looking over their shoulders. After all, ordinary business concerns had shareholders who had many ways of looking over shoulders. He was sure that the nationalised industries would welcome some reasonable forum where they could discuss and explain facts concerning their businesses in a way which was quite impossible in the House. It was not the idea that the Committee should be a sort of Star Chamber that would invigilate a Minister and haul him before them when they liked. That could only be done by the House as a whole, not by remote control through a Select Committee. The Committee would render the House a great service by sifting and winnowing the facts and in presenting them to the House in a digested form. Its duty did not extend to inquiring into the B.B.C. or the Independent Television Authority.

European Free Trade

When the Government's decision to join the discussions on the proposed European free trade area was debated in the House of Commons it was generally welcomed, although there were some M.P.s who said that the longer working hours, lower wages, and lower taxation in competing European countries would put British industry at a disadvantage. The electrical industry was not mentioned specifically. All members agreed that Britain could not afford to allow Germany to dominate a market of perhaps 250 million people.

Mr. Harold Macmillan, the Chancellor of the Exchequer, said that whether or not this plan was adopted, British industry would have to live more and more in a competitive world. The Government would try to maintain the right economic climate to encourage efficiency, but it depended really on industries themselves manufacturing the right products at suitable prices, and on their power to adapt themselves and exploit a great market. The difficult problems we

would have to face on entering a free trade area were those we would have to face anyway.

Mr. Nabarro complained that no one had spoken of the manifest difficulties of the scheme. It would be nearly impossible to suppress some of the unfair trading practices on the Continent.

Mr. Martin Maddan believed that those industries which would suffer through the scheme would probably suffer in any case. If that was the prospect, it was better that encouragement should be given to stronger industries to fill the economic vacuum. Those industries likely to gain were iron and steel, chemicals, engineering products and machinery, aircraft, and commercial vehicles.

Mr. Geoffrey Rippon thought it significant that the majority of the industries approached for their views by the Federation of British Industries welcomed this scheme, subject only to safeguards to ensure fair competition. This response showed that British industry was far more competitive than the pessimists appreciated.

Mr. Peter Thorneycroft, President of the Board of Trade, at the end of the debate, said the Government had not put forward any cut-and-dried plan. One thing which emerged clearly from all the Government's talks with the Commonwealth, with industry, the T.U.C. and from the debate, was that they could now enter the discussions with a firm determination to secure an acceptable scheme. There was no short or convenient way of avoiding competition in this world. If the taxation imposed by the Government, or the still higher taxation forecast by the Opposition, was really detrimental it was an argument for adjusting taxes, not for staying out of a common market. If, to be more competitive, we had all to work a little harder or think more, the sooner we set about it the better.

Restrictive Trading Agreements

The Registration of Restrictive Trading Agreements Order, which had been approved by the Commons, was approved by the House of Lords on the motion of Lord Mancroft, Under-Secretary, Home Office. He said that the period for registration would begin on 30th November and last for three months. If agreements were dropped before the close of the registration period (28th February, 1957) they need not be registered. If an agreement was modified in the period it was the modified version which had to be placed on the Register. No doubt there would be a great deal of critical examination of agreements in the coming weeks. Once the Register was open it would be possible to select the first cases to be brought before the Restrictive Practices Court.

In reply to Lord Lucas of Chilworth, Lord Mancroft said that in the Schedule of the Order it was stated that "agreements" included arrangements between traders, therefore schemes for regulating the distribution of goods were liable to fall within its scope and become subject to registration.

Lord Lucas: "If 100 manufacturers appointed the same organisation as their agent and the terms and conditions of the sale of their articles precisely coincided, would that be taken as an arrangement, even if there were no 'agreement'?"

Lord Mancroft said that, on the face of it, it looked very much like it.

Progress at Dounreay

Mr. Hector Hughes asked the Lord Privy Seal the present state of development of the atomic breeder reactor at Dounreay.

Mr. R. A. Butler replied that construction of the reactor was proceeding according to programme and was two-thirds completed. There were 646 Atomic Energy Authority employees and 1,500 contractors' employees. There were also 250 contractors' employees working off the site, for example, on housing development.

Railway Modernisation

In a debate on the British Transport Commission's proposals for the modernisation of the railways, Lord Hurcomb said he had advocated electrification for 30 years and found it regrettable that the process had been delayed so long that it could be carried out only at an enormously enhanced cost. It was a slight consolation that, as a result of the delay, it was now possible to adopt a new method involving a.c. at high voltages.

Lord Falmouth said that with an electric locomotive it was possible to run from London to Glasgow, spend half an hour oiling, and then come back again. No steam locomotive in the world could do that.

The Earl of Selkirk, for the Government, said that increases in receipts following the introduction of diesels had been quite striking. The Bury-Bacup line showed an increase of 238 per cent above the previous receipts; on the Birmingham-Lichfield line it was 238 per cent; and on the King's Lynn-Dereham line it was 90 per cent. That showed that the railways in this sphere were getting back the traffic from the roads. The Commission had stated that a steam stopping train had a movement cost of about 10s a mile, whereas in favourable conditions the multiple unit diesel had a movement cost of only a third of this figure. Thus the magnitude of the economies to be derived from modernisation could be appreciated.

British Uranium Deposits

Mr. Hector Hughes asked the Lord Privy Seal what surveys had been made for the discovery and working of uranium and thorium in Great Britain and with what result.

Mr. R. A. Butler said the geology of the United Kingdom had been mapped in greater detail than any other area of comparable size in the world. Pockets of uranium occurred in Cornwall, and small quantities in the Isle of Man. Recently, continued efforts by the Geological Survey Museum had located further deposits in these areas but neither these nor the deposits discovered earlier justified the erection of a treatment plant. No thorium deposits had been discovered in the United Kingdom.

Scottish Television Station

Dr. Hill, Postmaster-General, informed Mr. N. McLean that the B.B.C. hoped to bring the television station at Rosemarkie, near Cromarty, into operation by the summer of 1957, and the v.h.f. sound broadcasting station the following year.

New York World Fair

In reply to Mr. Mulley, the President of the Board of Trade (Mr. Thorneycroft) said that all the usual facilities of information and advice were at the disposal of firms considering participation in the New York World Fair next April. The Board of Trade itself would have a stand at the Fair.

Electricity Reorganisation

Mr. Palmer asked the Minister of Fuel and Power what consultations he had had with the chairman and members of the C.E.A. in connection with the proposed legislation for the reorganisation of the electricity supply industry; and with what result.

Mr. Aubrey Jones said he had had consultations with the chairman and two deputy chairmen of the C.E.A. and all the chairmen of the Area Boards. In formulating the proposals that he had laid before Parliament, full account was taken of their views upon the organisation of the industry.

PRICES OF MATERIALS

In the accompanying table we give the basis prices of the more important materials used in the electrical industry. The figures given are the selling prices and are those quoted on Tuesday last.

ALUMINIUM ingots	ton £197 0s 0d
COPPER, H.C. Electro	ton £280 0s 0d
Fire Refined 99·7%	ton £279 0s 0d
Fire Refined 99·50%	ton £278 0s 0d
COPPER Tubes ..	lb 2s 8d
Sheet	ton £345 0s 0d
H.C. wire and strip ..	ton £309 0s 0d
LEAD, English ..	ton £117 15s 0d
Foreign	ton £116 0s 0d
MERCURY	flask £83 10s 0d
TIN, block (English) ..	ton £855 0s 0d
ZINC, G.O.B. Foreign	ton £102 15s 0d
Electrolytic	ton —
BRASS Tubes (solid drawn)	lb 2s 2½d
Sheet	ton —
Wire	lb 2s 10¼d
PHOSPHOR BRONZE Wire	lb 4s 4½d
PLATINUM	oz £34 0s 0d
RUBBER, No. 1 R.S.S. spot	lb 33½d—33¾d

PERSONAL AND SOCIAL

News of Men and Women of the Industry

The National Inspection Council for Electrical Installation Contracting has appointed **Mr. E. J. Sutton,** M.I.E.E., as its chief technical officer. Mr. Sutton is at present a partner in the firm of Winton Thorpe, Tunnadine & Partners, consulting engineers, and is a member of the Association of Consulting Engineers. He has been a member of the I.E.E. Wiring Regulations Committee and he is also a prominent member of the Association of Supervising Electrical Engineers, being chairman of the committee which has just produced the A.S.E.E. Guide to the 13th Edition of the I.E.E. Wiring Regulations. He is chairman of the organising committee of the Electrical Engineers Exhibition.

Mr. E. J. Sutton

Mr. P. G. Wallis

Mr. P. G. Wallis, Associate I.E.E., who was president of the Electrical Contractors' Association in 1950-51, has agreed to continue to assist the Council in a part-time honorary capacity, as he has done for the past eight months. During this time he was responsible, amongst other things, for preparing the "Rules Relating to Enrolment in the Roll of Approved Electrical Installation Contractors," and the forms of application and inspection in connection therewith.

The following appointments have been made in the Steam Turbine Engineering Department of the Metropolitan-Vickers Electrical Co., Ltd.:— **Mr. W. Davies,** B.Sc., to be assistant chief engineer (large steam turbines) and **Mr. F. D. Roberts,** Assoc.M.C.T., to be assistant chief engineer (medium and geared steam turbines). **Mr. J. C. London,** B.Sc., A.M.Inst.C.E., A.M.I.Mech.E., A.M.I.Mar.E., continues as development engineer, Steam Turbine Engineering Department.

Mr. Davies was educated at Leigh Grammar School and Manchester University. After serving with the R.N.V.R. (Anti-Submarine Division) he became a college apprentice with the Metropolitan-Vickers Co. and joined the staff of the mechanical drawing office in 1922. Subsequently, after a period on turbine development work, he transferred to the Mechanical Engineering Department, specialising in the design of large turbines for power station installations. In 1951 he was appointed engineer-in-charge, large turbines.

Mr. Roberts went to Trafford Park as a school apprentice in 1917; he won both Lancashire County and B.E.A.M.A. scholarships, and received his technical education at the Manchester College of Technology. Since 1920 he has been with the Mechanical Engineering and Steam Turbine Engineering Departments, being particularly concerned with the design and development of geared turbines, single-cylinder turbines, marine propulsion turbines, and pioneer installations operating at high pressures and temperatures. In 1951 he was appointed engineer-in-charge, medium and geared turbines.

The company has appointed **Mr. H. Brown,** M.I.T.A., as assistant traffic manager (home). Mr. Brown was previously with Ferranti, Ltd., whom he joined in 1926. For the last six years he has been transport superintendent at that company's Avenue Works, Chadderton.

The B.T.H. Export Co. announces the retirement on 30th November of **Mr. C. W. Peyton,** manager, overseas representatives and agencies. He is succeeded by **Mr. J. F. Pym,** A.M.I.E.E.

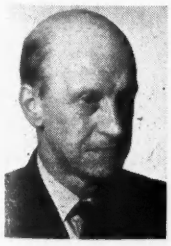
Mr. Peyton joined the B.T.H. (Rugby) switchgear drawing office staff in 1911. In 1913 he entered upon a two-year course in the Test Department, interrupted by war. Enlisting in the Royal Engineers in 1914, he was two years later commissioned in the R.A.S.C. On demobilisation in 1919, he returned to the B.T.H. Test Department, and in the following year joined the staff of the Export Department. From then onwards he was concerned, first at Rugby then at the Willesden Works, with switchgear contracts for territories overseas, as head of the Export Section. During the last war Mr. Peyton again served in the Army, for the most part with R.E.M.E., until released in 1944 to return to Willesden. On the retirement of Mr. R. C. Plowman in 1949, Mr. Peyton was appointed manager, overseas representatives and agencies, with his headquarters in Rugby.

Mr. Pym joined the B.T.H. Co. in 1919 as an engineering apprentice. Subsequently he served for twelve months with the Turbine Construction Department in the London area before taking up an appointment as charge engineer with the China Light & Power Co. (1918), Ltd., Hong Kong. In 1927 he rejoined the B.T.H. at Rugby in the Export Department, but a year later was appointed B.T.H. representative with Inniss & Riddle (China), Ltd., at Shanghai and Hong Kong. On his return to England in 1938 Mr. Pym was appointed publicity manager of the Hotpoint Electric Appliance Co., Ltd. At the outbreak of war in 1939 he was commissioned in the Royal Engineers, and after active service in the Middle East and Greece, was taken prisoner and interned in Germany from 1941 until 1945. Returning to civil life, he resumed duties with the Hotpoint Electric Appliance Co. and in 1948 was transferred to the B.T.H. Export Co. (London office) to take over responsibility for domestic appliance sales overseas, in succession to the late Mr. C. P. Sutthery.

Mr. C. W. Peyton

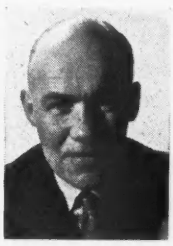
Mr. J. F. Pym

Commander M. Thornton, D.S.O., D.S.C., until recently Admiralty liaison officer to the Merchant Navy at Liver-



Mr. W. Davies

Mr. F. D. Roberts



Mr. J. C. London

Mr. H. Brown

pool, has been appointed controller of the Marine Division of W. T. Glover & Co., Ltd.

Mr. D. G. Dodds, LL.B., who, as we briefly reported in our last issue, has been appointed chief industrial relations officer of the Central Electricity Authority, has been secretary of the South Wales Electricity Board since 1948. In his new post he will be responsible for a range of functions which will include the negotiating machinery covering wages and conditions of employment throughout the electricity supply industry and the fields of education, training, safety, health, welfare and joint consultation. Mr. Dodds, who is a native of Newcastle, was appointed deputy town clerk of Cardiff in 1946 and became secretary of the South Wales Electricity Board shortly before the Board assumed responsibility for electricity supply in South Wales. He was, therefore, closely concerned with the arrangements for reorganisation of the industry in South Wales in the years immediately following vesting date. He takes up his new appointment in London on 1st January next.

Mr. D. G. Dodds

Among members of Council elected at the anniversary meeting of the Royal Society on 30th November were **Sir Claude Gibb,** K.B.E., chairman and managing director of C. A. Parsons & Co., Ltd., **Professor N. F. Mott,** Cavendish Professor of Experimental Physics, Cambridge University, and **Dr. B. F. J. Schonland,** C.B.E., deputy director of the Atomic Energy Research Establishment.

The Siemens-Ediswan organisation announces the appointment of **Mr. F. Bannister** as sales manager of its Accumulator and Starter Battery Division. Mr. Bannister received his early training in the accumulator industry with the Chloride Electrical Storage Co., Ltd., and whilst serving with the Army in India during the last war he was released to assist in the management of Chloride's new factory in that country. Returning to the United Kingdom in 1947 he was engaged on development and production with the Tudor Accumulator Co., and subsequently joined Varley Dry Accumulators, Ltd., as commercial representative for the northern areas. Mr. Bannister joined the Edison Swan Electric Co., Ltd., in 1951 as technical assistant to the Accumulator Department's sales manager, and for the past five years has concentrated on after-sales service for Ediswan accumulators.

Mr. F. Bannister

Mr. E. Bateman has joined the Jackson Electric Stove Co., Ltd., as technical representative in the South Wales Electricity Board's area. Previously he was for twenty years with the Hotpoint Electric Appliance Co., Ltd., and before that spent five years with the Jackson Electric Stove Co. at its Cardiff office. Mr. Bateman will be attached to the company's office at 10, Park Place, Cardiff.

The annual general meeting of the British Association of Machine Tool Merchants (Inc.) was held on 27th November at the May Fair Hotel, London, when **Mr. Arthur W. Bell,** B.Sc. (H. Bell (Machine Tools), Ltd.), was elected president of the Association for the ensuing year.

Mr. G. K. Nicholls, Associate I.E.E., of the Engineer-in-Chief's Department, Cable & Wireless, Ltd., has been appointed manager of the company's cable station and Engineering School at Porthcurno, Cornwall. He succeeds **Mr. C. J. V. Lawson,** deputy engineer-in-chief, who, as we have already reported, will become engineer-in-chief on the retirement of **Mr. I. A. Smale** in March, 1957. Mr. Nicholls was educated at Tettenhall College, Staffs., and joined the Eastern Telegraph Co.'s training school at Hampstead in 1923. This was followed by a wireless course at the Marconi College, Chelmsford, and service at the Brentwood and Ongar wireless stations. Overseas he served on the cable side at Carcavelos, Alexandria and Aden, and on the wireless side at Cairo and Lagos. Subsequently he was appointed to the Engineer-in-Chief's Department at head office on planning new projects and plant maintenance. This work entailed visits to overseas branches.

Mr. G. K. Nicholls

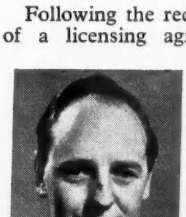
The Society of Engineers has awarded the Churchill Gold Medal for 1956 to **Sir Christopher Hinton,** F.R.S., for his work on atomic energy. It was presented at the Society's annual dinner at the House of Commons on 30th November.

The **Electrical Association for Women** was "at home" at its headquarters, 25, Foubert Place, London, W.1, on 26th November to a representative number of women's organisations. In the accompanying picture Miss Mary George, M.B.E., B.A., the director and secretary of the E.A.W., is seen discussing with Mrs. Marjorie Byrne, chairman of the Women's Advisory Committee, British Standards Institution, an electric fire fitted with a safety guard.

Miss Mary George (director, E.A.W.), with Mrs. Marjorie Byrne (chairman, Women's Advisory Committee, B.S.I.), at an E.A.W. "at home"

Mr. G. R. Buckley and **Mr. C. G. Mackie,** directors of the Stanton Ironworks Co., Ltd., have been appointed assistant managing director (works) and assistant managing director (commercial), respectively. **Mr. N. C. Macdiarmid** has been appointed assistant managing director (general). All three have been appointed directors of Cochranes (Middlesbro') Foundry, Ltd. Mr. Wilson retains the position of general manager of the company.

Following the recent announcement of a licensing agreement with the American Kearfott Co., Inc., R. B. Pullin & Co., Ltd., have now appointed **Mr. G. B. Jeffery,** M.A., B.Sc., A.M.I.E.E., as technical sales manager of the new Kearfott Division, which will manufacture in this country synchros, servomotors and tachometer generators. Mr. Jeffery has joined the company from the Royal Aircraft Establishment, Farnborough, Hants., where he has served as a senior engineer in the data transmission section of the Electrical Engineering Department. He has also served with S. Smith & Sons (England), Ltd., and E.M.I. Engineering Development, Ltd., and as a radar officer, R.N.V.R., during the war when he was a staff member at the Radar School, H.M.S. *Collingwood.*



Mr. G. B. Jeffery

There was a lively discussion at a meeting of the E.A.W. held on 21st November, at the Institution of Electrical Engineers, at which Miss Elizabeth Gundry (*News Chronicle*),

Miss Sidney Foot (Council of Industrial Design) and Mr. T. O. Freeth (E.I.M.A.) spoke on "Planning for Light," in the course of which they answered a number of questions put by members of the Association.

The author of the article which appears in this issue (page 1037) on the influence of agriculture on public electricity supply,

Mr. R. H. M. Barkham

Mr. R. H. M. Barkham, B.Sc. Eng., M.I.E.E., took up the appointment of chief commercial officer of the Eastern Electricity Board in 1955. He received his early training with Crompton & Co., Chelmsford, and then joined the East Anglian Electric Supply Co., Ltd., at Stowmarket. This company and the associated companies were responsible for supplying electricity to a substantial part of the rural area of East Anglia. In 1943 he was transferred to Grantham to take charge of a small group of Edmundson Electricity Corporation, Ltd., undertakings, and was subsequently, in 1945, appointed manager of the Urban Electric Supply Co., Ltd. At vesting day Mr. Barkham became manager of the Essex Sub-Area of the Eastern Electricity Board.

The Central Electricity Authority announces that **Mr. F. W. Smith,** C.M.G., M.C., who has been chief contracts officer to the Authority since March, 1950, will be retiring on 31st December. He has agreed to give the Authority the benefit of his services on a part-time basis as contracts adviser.

At the annual general meeting of the Junior Institution of Engineers, held on 30th November, **Mr. J. E. Gray** was elected chairman for the ensuing year.

Mr. H. F. Akehurst, B.Sc., A.M.I.E.E., who has been appointed to the board of British Insulated Callender's Cables, Ltd., as director (overseas operations), was educated at Oundle School and Leeds University. He joined the former Callender's Cable & Construction Co., Ltd., in 1930 and proceeded immediately to India where he served for seventeen years. During this time he was engaged on both sales and contracts work, and was employed for a considerable period on the Uhl River hydro-electric contract. In 1947 he became joint manager for India, and in the following year returned to London on his appointment as joint export manager. In 1953 he became responsible for the B.I.C.C. overseas factories organisation and in January, 1955, he was appointed an overseas manager of the company. He is also deputy chairman of B.I.C. (Export), Ltd.

Mr. H. F. Akehurst

Mr. E. K. Cole, chairman and managing director of E. K. Cole, Ltd., left on 1st December for Australia, to visit the associate company in Sydney, Ediswan-Ekco (Aust.) Pty., Ltd., which is jointly owned with Associated Electrical Industries, Ltd. He will travel via the United States and will also visit the National Ekco Radio & Engineering Co., Ltd., Bombay, and the Ultimate-Ekco (N.Z.) Co., Ltd., Auckland.

Mr. L. Shavick, B.Sc., A.R.C.S., has joined the sales development staff of Gresham Transformers, Ltd. He graduated at the Imperial College of Science and Technology and has for two years been an engineer officer (R.N.V.R.) in the Fleet Air Arm.

Mr. E. G. Thompson, who has been appointed technical sales manager of Baird & Tatlock (London), Ltd., has relinquished his post of public relations officer, and this function has now been taken over by **Mr. D. J. Wykes.**

Mr. R. McGlashan, A.M.I.E.E., G.I.Mech.E., who is a member of the Chief Commercial Officer's Department of the South of Scotland Electricity Board, has had conferred upon him the City and Guilds of London Institute Insignia Award in Technology. The award is for his thesis, "Thermal Storage Electric Space Heating in Relation to Electricity Supply in Great Britain."

Mr. R. McGlashan

A concert programme which includes such contrasting composers as Wagner, Dvorak, Schumann, Sullivan and Gounod can justifiably be called a "Music for All" programme. This was the title given by the **Lessa Music Society** (a section of the London Electricity Sports and Social Association) to its concert at the Central Hall, Westminster, on Tuesday last week. The overture to "Die Meistersinger" is a good beginning to any programme and in this and the more exacting fourth symphony of Dvorak which followed later, the orchestra, under the firm direction of Leslie Atkins, gave finished performances. The other major work was Schumann's piano concerto in A minor in which the pianist, Arthur Whitehead, displayed considerable skill in overcoming its many technical difficulties. Sullivan's "Pineapple Poll" may seem an oddity in such company, but it proved a happy contrast. On the choral side, the choir sang four part songs well, under their choirmaster, Douglas Sharpe.

The second half of the programme opened with carols and in the final item, the choral ballet suite from Gounod's "Faust," the choir combined splendidly with the orchestra. Not the least pleasing feature of the evening was the support accorded the Society, the Great Hall of the Central Hall being practically filled.

Dr. A. Alan Taylor has recently taken up an appointment in the Marketing Department of the National Coal Board's headquarters, where he will be head of a section dealing with coal price policy and fuel utilisation. Since 1948 Dr. Taylor has been fuel technologist with the Central Electricity Authority, and has principally been concerned with the economics of the supply and use of fuel in power stations.

Dr. A. A. Taylor

Mr. C. A. F. Beaumont, A.C.A., has been appointed chief accountant to the London Electricity Board. After qualifying as a chartered accountant, Mr. Beaumont was on the staff of Messrs. Deloitte, Plender, Griffiths & Co. In 1946 he was appointed assistant chief accountant to the Metropolitan Electric Supply Co., Ltd., and subsidiary companies, and at vesting day joined the staff of the Southern Electricity Board as assistant chief accountant. The London Board has also appointed **Mr. J. S. Burton,** A.A.C.C.A., to be deputy chief accountant. From 1926 to 1948 Mr. Burton was with the County of London Electric Supply Co., Ltd., and at vesting day was personal assistant to the chief accountant. Since then he has been an assistant chief accountant with the London Board.

Mr. I. W. F. Fairholme has been appointed a director of Richard Johnson & Nephew, Ltd. He will continue to act as general works manager.

OBITUARY

Mr. George Crawford, who was on the staff of Watson-Norie, Ltd., Newcastle-on-Tyne, was killed on active service on 6th November while serving with the 1st Battalion of the Somerset Light Infantry in Egypt. Mr. Crawford, who was twenty-five, served his apprenticeship with Watson-Norie, Ltd., followed by three years' military service in Malaya. He returned to the company in January this year and was recalled in August.

Shop and Display Lighting

Part of the A.E.I. Lamp & Lighting Co.'s new display at the Mazda showrooms

LAST Monday the A.E.I. Lamp & Lighting Co. opened an exhibition of shop and display lighting equipment in the Mazda showroom at Crown House, Aldwych, London, W.C.2.

A showroom interior has been created by Messrs. Robert Wetmore, M.S.I.A., and Frederick Dickinson, M.S.I.A., with the use of an entirely different ceiling formation and the installation of semi-permanent displays. A false ceiling has been installed throughout the showroom, with the exception of a central well, the bounding facia of which carries the whole range of over 120 newly-introduced lighting fittings. An important part is played in the exhibition by actual display windows dressed by London stores, each embodying specially designed lighting, and there is a jewellery showcase displaying the work of the Royal College of Art Silversmithing and Jewellery Department.

One corner of the exhibition is devoted to a demonstration of lighting in a self-service grocery store with "Showmore" equipment supplied by Parnall & Sons and another to getting the best out of colour and texture in furnishings and fabrics. Liberty's have dressed a window which may be lighted in a number of different ways at choice and visitors may experiment to obtain the effect of a variety of combinations of fittings.

The exhibition is fully mobile and each display is individually wired and complete in itself for use at forthcoming exhibitions at the company's recently opened Birmingham and Glasgow showrooms. The contractors were David Esdaile & Co., Ltd.

E.C.A. Branch Dinners

Sir Herbert Barber stated at the annual dinner of the Fylde branch of the Electrical Contractors' Association at Blackpool, on 28th November, that in this country there were 3,000,000 homes with electrical installations 25 to 30 years old, and perhaps two in every three would not satisfy present-day demands. The public must be protected against the self-styled electrical contractor. Also efforts must be made to prevent installation work being done by the handyman, in many cases with no electrical experience. Second-hand appliances ought to be properly tested to ensure they were safe. The sale of appliances of doubtful origin should be prevented. A move in the right direction was being made by the new Inspection Council for Electrical Installation Contracting.

Trade associations were defended by Mr. W. J. Bird, home sales manager of the G.E.C., when he spoke at the annual dinner of the Birmingham branch of the Association in Birmingham on 28th November. He said that there was a tendency to-day to vilify trade associations and talk of restrictive practices. It was worth pointing out that when the Monopolies Commission started its work the price of ordinary lamps was 20 per cent less than pre-war, if one did not take into account purchase tax, for which the industry was not responsible. At that time, too, copper was £110 a ton; it had since risen to four times that amount.

Changes in trade structure were bound to come but they must be approached logically. Sections of the industry must get together to agree on what should be the margin on which retailers worked, to see that the contractor had a fair reward for what he did and to agree how the wholesaler was to fulfil his function. This was for the good of the industry. The president, Mr. A. V. Milton, replying to the toast of the Association by Mr. Bird, said it was illogical to suggest that the industry should be conducted without planning. Joint action in the structure of the industry was planned economy and it was nonsense to call it a restrictive practice.

Nuclear Energy Trade Associations' Conference

The practical development of nuclear engineering techniques is being taken in its stride by manufacturers. These lie in different sectors of the engineering industry for which separate trade associations serve. In order to establish a permanent means of liaison on matters relating to nuclear energy and associated developments, the Nuclear Energy Trade Associations' Conference (N.E.T.A.C.) has been formed.

Membership, which in no way restricts the autonomy of the participants, is open to those trade associations concerned with nuclear energy equipment. The founder members of N.E.T.A.C., all of which are closely connected with the field of nuclear energy, are: British Chemical Plant Manufacturers' Association; British Electrical and Allied Manufacturers' Association; British Engineers' Association; Scientific Instrument Manufacturers' Association; and the Water Tube Boilermakers' Association. The chairman for the time being is Mr. W. K. G. Allen (W. H. Allen, Sons & Co., Ltd.), president of the B.E.A., whose staff serve as the secretariat for N.E.T.A.C. The address of the Conference is 32, Victoria Street, London, S.W.1.

Electrical Housecraft

The importance of combining technical knowledge with domestic science was emphasised by Mr. W. F. Houghton, M.A., L.C.C. education officer, in welcoming the one-day conference on the teaching of electrical housecraft arranged by the Electrical Association for Women at Battersea Polytechnic on 24th November. It was attended by some fifty teachers of domestic science in schools and technical colleges in the London area, the Home Counties and the Midlands. A welcome was given by Miss Mary George (E.A.W. director) and by Miss F. M. Earle (senior lecturer and deputy head of the Hotel and Institutional Management Department of the Polytechnic). Those present also included Miss C. A. Blackmore (L.C.C. chief inspector of housecraft) and Miss Gawthorpe (domestic subjects organiser for Middlesex). The four main subjects were: "The Use and Care of Electric Cookers, Cooking Equipment and Refrigerators," by Mrs. M. Pickford (head of the E.A.W. Housecraft Department); "The Use and Care of Electrical Laundry Equipment," by Mrs. E. A. Windsor (electrical housecraft adviser, London Electricity Board); "The Teaching of Electrical Housecraft in Schools," by Miss M. J. Gordon (senior science mistress, Godolphin and Latymer School); and "The E.A.W. Educational Programme," by Miss Vera Norvick (assistant secretary, E.A.W.).

Electrical System Stability

STUDY OF TRANSIENT POWER SYSTEM PROBLEMS DISCUSSED

THREE papers bearing on problems of transient stability in electrical power systems were presented on 28th November before the Institution of Electrical Engineers' Supply Section. The first, by Messrs. C. Adamson, L. Barnes and B. D. Nellist (Manchester University), described the theory and methods of construction and operation of an automatic step-by-step computer for power system swing curves (load angle against time). A direct-analogue method for use with the generator units of a network analyser had been devised. The chief disturbances were, in order of increasing severity, sudden large load increases, switching operations and faults with subsequent isolation of the section involved. A large-scale network analyser could be equipped for the solution of swing curves at a cost per generator not exceeding 1 per cent of the cost of a complete installation. The accuracy obtainable would be within that normally required for power system stability studies.

In the second paper Messrs. A. S. Aldred and P. A. Doyle (Liverpool University) gave particulars of a d.c. electronic-analogue-computer study of synchronous-machine transient stability by means of an electronic-analogue representation of system equations which was claimed to be more accurate than any method hitherto employed. The authors showed that variations in the field flux could appreciably affect stability and that instability could occur subsequently to the first rotor oscillation.

The final paper, by Mr. S. Kaneff (Adelaide University), dealt with the dynamic operation of an a.c. network analyser, which could solve steady-state as well as transient power system problems automatically without the need for step-by-step processes. Representation of the synchronous machines was based on the phase-modulation method. An existing analyser could be converted to dynamic operation by the modification of the generator units only.

Change of Attitude

Prof. M. W. Humphrey Davies (Queen Mary College) said that the three papers showed the way in which the general attitude towards stability problems had changed during the last five or six years. The initial idea was to try to mechanise the problem of ordinary swing-curves. The idea had gradually extended until it was implicit in all three papers that the greatest need for more precise calculation of the dynamic behaviour of machines was not in the normal stability study but in the design of the auxiliary components of the machine. Work was being done on this using the ordinary electronic differential analyser equipment but it had not previously been possible to consider the dynamic behaviour of two or more machines coupled together. All three papers showed ways of doing this. He stressed the need on the machine side for better knowledge of machine non-linearities and on the computer side for more attention to criteria for the design of the control system.

Mr. A. Chorlton (C.E.A.) said the synchronous machine simulator described by Kaneff constituted a valuable development which eventually should considerably enhance the value of the conventional static a.c. network analyser. The most important requirement in his view was consistent results from a representation of the same problem. He viewed the device as a useful universal machine suitable for application to most a.c. network analysers where only the first swing conditions were required and asynchronous phenomena could be studied. It would be of interest to know the cost involved in this application. He doubted the usefulness of the device for the inclusion of other parameters except damping and it would seem difficult to neglect the effects of automatic voltage regulators and exciter response for differential time-scales, as the introduction of actual components was precluded. The analogue method suffered from the same disadvantage as Kaneff's method where different time-scales from actual time were required and constant impedance was used for machine representation. It was not clear whether the analogue was more or less accurate than the one described in the first paper. The assumptions were the same without the extra flexibility of simulating transiency and variable field flux linkages.

Synchronous Machine Performance

Mr. T. M. Whitelegg (B.T.H.) said the problems associated with synchronous machines could be divided into two groups—those in which the performance of the machine and its control systems was of prime interest, the effects of the external system being of second-order importance; and those in which the system was of primary importance and a reasonably accurate representation with not too much detail was necessary for the solution of the system problem. For the first type the equipment described by Aldred and Doyle was more flexible and for the second the electro-mechanical analogue would be more appropriate.

Mr. P. G. Kendall (E.R.A.) said that one gain in accuracy from the use of the simulator as compared with step-by-step methods was the avoidance of errors in calculation and in the reading of meters and setting of dials which resulted from the ordinary hand operation of a network analyser. Although repeatable results were essential, it was also essential that the results when repeated should reasonably relate to the truth. The paper by Aldred and Doyle was valuable in that it investigated factors whose influence was normally ignored.

Mr. G. Lyon (Merz & McLellan) commented that this was the first time an attempt had been made to find common ground between the different approaches to the solution of the stability problem. One problem was to reduce the time required for an adequate stability survey of transmision schemes. At present, the time in man-hours was terrific and sometimes prohibitive. For practical purposes, the rough and ready method was sufficiently accurate but for control problems and variations in plant parameters more accurate methods were required. The set-up time on load studies on normal network analysers could be much reduced by the simulator type of generator unit. He thought the main applications of automatic devices should be divorced, two different approaches being developed to fulfil the two functions.

Mr. P. D. Aylett agreed that there was need for division of labour between the refined type of analogue and the

one for day-to-day use on a large analyser. He noted that no satisfactory definition seemed to have been arrived at for stability of a system which was stable after disturbance. If, as he believed, integrals could be established for a system which enabled a decision to be made on the basis of all the velocities and angles whether the system would remain stable, digital computers might prove more useful than analogue computers. The criteria could be inserted and at a certain point equality could be established which would show whether the system was and would remain stable.

Mr. R. A. Hore (Merz & McLellan) said that with the availability or impending availability of the simulators described a position had been reached where with reasonable labour, though not perhaps at reasonable expenditure, account could be taken of the majority of refinements in synchronous machine representation as and when one wished. In the majority of cases a simple simulator of the type described by Adamson, Barnes and Nellist was required for ordinary work and nothing faster. But there should be one or two simulators somewhere in the country for investigating awkward problems where no one knew what had happened.

Mr. K. M. Jones (B.T.H.) said that in a network analyser study it was not only the transient stability problems which took a long time. The initial load balance might take two or three hours, depending on the size of the system and the skill of the operator. Simulators of the type described would perform this function quickly. On normal commercial work, as much time would be saved using simulators for obtaining initial load conditions as using them to do transient stability work. To eliminate assumptions and obtain higher accuracy was as important as speed. There would appear to be a demand for a simple device which could be used to represent the characteristics of composite load and which could be adjusted so that the load dropped in discrete steps as the voltage on the load dropped.

LETTERS TO THE EDITOR

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents.

Advanced Steaming Conditions

I NOTICE from your leading article in the *Electrical Review* of 16th November the mention of the contract recently awarded to this company by the Steel Company of Wales, Ltd., for the supply of a Benson O-T boiler. In view of your remarks I would like to offer the following comments in amplification of the information you have already received, so that there will be no possible misunderstanding regarding the purpose of this particular installation.

The Benson O-T boiler is a well-established design and is already in use in a great many central power stations on the Continent for pressures of up to 3,000 lb/sq in and temperatures in excess of 1,100 deg F. The installation for the Steel Company of Wales is essentially a " topping " installation whereby steam is generated at high pressure and a temperature of 1,060 deg F and passes through a back-pressure turbine into the present 600 lb/sq in system. Although these high temperatures do call for the use of special alloys in certain sections of the plant the extra cost of these materials is offset by economies resulting from the particular features of the Benson O-T boiler design. Furthermore, the electricity obtainable as a result of back-pressure generation combined with the high overall efficiency of the installation will quickly repay the difference in capital cost between the conventional 600 lb/sq in scheme and an e.h.p. scheme. The scheme should therefore prove a sound economic proposition as in any case extra process steam is required.

You will see, therefore, that as far as this installation is concerned the question of comparison with nuclear power generation does not enter into the matter at all as the project is related in this case entirely to steelworks conditions. The boiler will be fired by blast furnace gas and its efficient use leads to vast improvement in the overall heat efficiency of an integrated steelworks.

Apart from the above remarks, however, we are of the opinion that for central station work, despite the advent of nuclear power, it must be an attractive proposition for central power station conditions to generate at the highest possible pressures and temperatures and thus achieve the highest overall thermal efficiency, particularly in view of the rising price of fuels.

H. CLARKE,
Joint Managing Director,
Simon-Carves, Ltd.

Cheadle Heath, Stockport.

All-Electric House Costs

MESSRS. Harman and Shorrock's assumption about the consumption of electricity for cooking (*Electrical Review*, 23rd November) is quite reasonable and their arithmetic is flawless but what does it prove? I do not think that any reasonable person would claim that heat units are cheaper with electricity at 1·1d/kWh than with a boiler operating at an efficiency of 80 per cent burning anthracite at £13 a ton but it is surely the cost of the service and not the cost of the heat unit that matters, and matters, incidentally, much more than the assumption that it is possible to operate a domestic boiler at an efficiency of 80 per cent with a consumption of 30 lb of anthracite per week.

In the first place after the cooking has been allowed for the rest of the consumption covers not only the space heating but water heating, larder cooling, lighting and the normal power services of the home. Can all of these be supplied from 30 lb of anthracite a week? Secondly, the chief economic justification for electric heating is that by its flexibility of control it enables the requirements of the household to be met with less heat units than are required with less flexible methods. Heat where you want it and when you want it, in other words.

The expression " If we are to believe the figures " seems to show that Messrs. Harman and Shorrock question the integrity of the Woking District commercial staff of the Electricity Board and it is only fair perhaps to point out that they did not actually claim that the running costs were reasonably cheap.

The words " cheap " and " expensive " have no precise meaning, but for me and, I think, for the majority of your readers, to get all the heating services for the home with lighting and power thrown in and dirt and trouble thrown out for 11s a week, which is less than the national average, is really cheap.

E. M. ACKERY.

London, W.C.2.

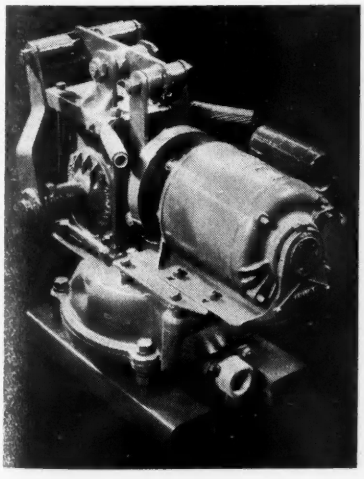
SMITHFIELD SHOW

THE increasing reliance of farmers on electrical aids in all branches of their work is clearly demonstrated at the Smithfield and Agricultural Machinery Show which is being held this week at Earls Court, London.

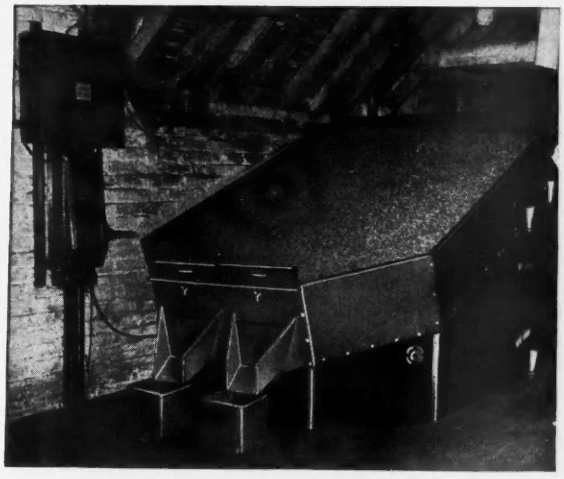
Hay and corn harvesting conditions this year were among the worst on record, crops suffering extensive damage through lack of suitable drying equipment. The application of electricity to the drying of grain and grass is well illustrated on the British Electrical Development Association's stand where four different methods are covered—platform drying, in-silo drying, barn hay drying and dual-purpose drying. The equipment shown includes a G.E.C. multi-crop dryer suitable for a 20-hole platform, a G.E.C. cold-blow barn hay dryer, a Woolley 20-hole platform grain dryer and a Gandley silo ventilating unit, suitable for six 10ft diameter silos of 910 sacks capacity. A separate working exhibit is devoted to electrical equipment for grain handling and conveying, including a 10ft Wallace conveyor-elevator with a ¾ h.p. motor and a Gordon Felber auger type conveyor powered by a ½ h.p. motor. To illustrate the simplicity and precision of electrical apparatus for measuring the moisture content of grain, examples of instruments made by Marconi Instruments, Ltd., Scottish Mechanical Light Industries, Ltd., and Opancol, Ltd., are available for examination on the E.D.A. stand.

New Grain Dryer

The important part electric grain dryers played in the gathering of this year's harvest is emphasised on the G.E.C. stand. Actual equipment displayed includes a 13 kW unit platform dryer and a large vertical silo dryer, each with appropriate control panel. Models and photographs depict multi-purpose dryers, a tray dryer, standard and Simplex silos and tunnel dryers. The tray dryer is completely new and has been designed to serve the farmer who has to dry comparatively small quantities of grain. It has a capacity of 50 cu ft and will hold approximately one ton of clean wheat or barley. The extraction rate is about 1 per cent hourly. The tray is of all-steel construction, with a specially designed perforated metal floor. It has two discharge outlets with sliding valves for bagging-off or emptying on to a conveyor or into a pit. The drying unit consists of a 0·7 b.h.p. Woods of Colchester "Aerofoil" fan and a 22 kW G.E.C. duct air heater with thermal protection and guard. A control panel with main isolator, circuit fuses, contactors, heat control and starter switches, is supplied with the dryer.



"Alcon" 1½in disc pump (Arthur Lyon & Co.)



Typical installation of the new G.E.C. tray dryer for grain

Other new equipment on the G.E.C. stand includes 250 W infra-red pig and poultry warmers, the principal feature of which is their all-insulated construction, eliminating the need for earthing. They are made in two models, one for a single lamp and the other consisting of two single-lamp units mounted in a "Perspex" coupling strip with a junction box for the wiring. The company also shows a dull-emitter type having a new attachment with a 15 W "Osram" pilot lamp. Improved potato chitting fittings, including one housing a single 8ft tube instead of two 4ft tubes, are displayed, as well as photographs which illustrate the complete range of G.E.C. dairy equipment.

Of particular interest among electrical equipment for the farm shown on the British Thomson-Houston Co.'s stand is a range of "Stayrite" motors and starters. These have been designed as composite units especially for use in agricultural and industrial establishments served by single-phase supply systems. The "Stayrite" power drive consists of two components, the motor and its starting unit, made in ratings from 2 to 5 h.p., 230/240 V, 50 c/s, single-phase. The motors can be supplied with protected, or totally enclosed, fan-cooled enclosures, as desired. Among f.h.p. types is a new 1½ h.p. motor developed for agricultural use. Typical B.T.H. "Pyrobar" electric heaters for steam boilers, sterilisers, water heating and space heating are shown, and in a special display is the "Pyrobar" infra-red dull-emitter heater used in the rearing of pigs and poultry. A single unit is claimed to be adequate for rearing an average litter of piglets from birth to six or eight weeks, or for brooding up to 100 day-old chicks until they are eight weeks old.

The "Alcon" 1½in disc pump, which is intended for dealing with water containing abrasive material, solids in suspension, mud and liquid manure, is being shown for the first time by Arthur Lyon & Co. (Engineers), Ltd. It consists of a cast-iron pump chamber on which is mounted a ½ h.p. single-phase or three-phase 2,850 r.p.m. Brook induction motor driving a worm gearbox which in turn transmits the motion through a linkage mechanism to the pump spindle. The pump has an output of 1,200

gal/hr and has been designed to run continuously with the minimum of maintenance and lubrication. The diaphragm and non-return valve are made of a special grade of rubber, interleaved with canvas, and the pump spindle and top bearing spindle are of stainless steel. Arrangements can be made for an alternative 2in outlet in place of the normal 1½in size.

F. Perkins, Ltd., are showing their full range of agricultural diesel engines, while on the C.A.V. stand is a representative selection of diesel fuel injection equipment, and electrical equipment for agricultural tractors and stationary and portable engines, including starters, dynamos, control boards, batteries, etc., and lamps for tractor use.

Among refrigeration equipment Prestcold have several items that have not previously been shown publicly, including the " Super Presmetic " condensing units which have the motor and compressor assembled in the same housing. They can replace existing refrigeration equipment already installed and are suitable for use in all climates. New parade display cases include the " Island " model and, among frozen food display cabinets is the "Farmoor." Attention is drawn to the "De-frostermatic" refrigeration system which gives automatic defrosting regularly every few hours with the door closed, maintaining low temperature and consequently the condition of the food.

New electric fencing posts are shown by Wolseley Engineering, Ltd. With this type, to be known as the " Spear," a looped section of rigid p.v.c. has been affixed to the top of the post to form an insulator into which the wire can be inserted by merely twisting the post round before inserting it into the ground. The conventional triangular plate has been replaced by bending the lower portion of the post to form a step by means of which the post can be pressed into the ground with the foot. This company also shows the " Power-Pak," a portable power unit designed to perform a large number of jobs around the farm. It is equipped with two friction driven power take-off heads, separately clutched and designed to couple up to Wolseley flexible shafts. In addition to sheep shearing and cattle clipping the unit can be used, in conjunction with a tool chuck, as a portable drill (up to ½in diameter) or grinder.

Increasing Food Production

A TWO-DAY conference dealing with possible future lines of research into applications of electricity which will increase food production was held under the chairmanship of Sir Harold Hartley at the Institution of Electrical Engineers in London on Monday and Tuesday last week. The conference was organised by the Electrical Research Association and attended by delegates representing a wide diversity of interests both from this country and abroad. The papers and discussions did not deal with what had been done or what could be done to increase food production by electrical means, but discussed desirable topics for research in the future.

There was also a general discussion on the Monday evening on the future of British agriculture and its influence on rural electrification research. Prof. H. G. Sanders, C.B.E., M.A., presided.

Microwave Technique

Mr. J. T. Beresford, who opened the discussion, expressed the view that the use of the multi-purpose grass dryer had been carried too far and that the efforts of the North Western Electricity Board in developing small farm dryers should be concentrated so that the equipment could be sold to the farmers. Agriculture needed to know more about the tunnel dryer and about barn drying of hay. In fundamental research, he thought there was a valuable field of study in the microwave technique for the diagnosis and treatment of animal diseases. These diseases cost the country between £15 million and £20 million a year. He understood that all tissues had their own particular electrical emanations. Could these various wavelengths be recorded for use in work on animal disease? There should be further research on the use of controlled ultra-violet light in combating animal diseases.

Electricity Boards were concerned about the cost of maintaining farm connections. In 1942, the industry had evolved the B.S. 1320 light supply line. Was this the last word or could we further cheapen the cost of supply lines to farms?

Mr. Claude Higgs said that the ordinary farmer did not make as much use of the electricity supply available to him as he could. He also thought it should be impressed on farmers that they should have their installations frequently inspected by competent people. He urged the Association to forget the idea of using electric tractors on farms. The tractor had to do very many jobs, both on the farm and off it, and it could not do them if it were on the end of a piece of cable.

Prof. R. H. Stoughton divided the horticultural industry into three sections—market gardening, fruit growing and the glasshouse industry. In fruit growing, he thought we could not compete in providing bulk quantities of ordinary culinary fruit, but we could keep the industry alive with high-quality produce, for which we needed every possible modern aid. This entailed the control of pests and diseases, possibly by electro-magnetic radiation, although this might be a long way in the future.

The future of the market garden industry depended on irrigation, and for this the market gardener needed electricity. The glasshouse system of growing was the way in which the horticulturist could show his skill to the maximum extent, however. This required ability to control the conditions under which the plants grew, and future electrical research could play a big part by helping the horticulturist to control light, temperature and moisture. There was no doubt that when electricity could be reduced materially in price, the glasshouse industry of this country would improve its production by " leaps and bounds."

Waste Heat Utilisation

Prof. Stoughton and other speakers emphasised the great scope for research into the proper utilisation of waste heat from power stations in the production of food. One speaker reported a demonstration in France of an instrument which, by short waves, measured the depth of fatness in a live pig. He thought there was a great future for such an instrument.

Mr. Lowe pointed out that some of the nuclear energy power stations would be built in areas where the land was suitable for fruit growing. He thought the waste heat from such power stations might be used virtually to alter the climate, if there were millions of gallons of this hot water circulating around the orchard.

INDUSTRIAL NEWS

Engineering Wages Claim Rejected

Although they had announced in advance that any demand for increased wages could not be entertained, the Engineering and Allied Employers' Federation agreed when the claim was presented in October to refer it to its member firms. When representatives of the Federation met members of the Confederation of Shipbuilding and Engineering Unions on 29th November, the president of the Federation, Mr. F. C. Braby, said that the claim had been rejected by an overwhelming majority.

The director of the Federation, Mr. B. Macarty, gave reasons for the rejection, among them being the downward tendency of the volume of orders and the increasing competition in world markets. He contended that the current wages in the engineering industry compared favourably with those in other industries and they had risen faster than the cost-of-living index.

Nuclear-Quality Graphite

It is announced that a group of British companies, consisting of C. A. Parsons & Co., Ltd., A. Reyrolle & Co., Ltd., Sir Robert McAlpine & Sons, and Clarke, Chapman & Co., Ltd., in collaboration with the Great Lakes Carbon Corporation of New York, is forming a British company to be called Anglo Great Lakes Corporation, Ltd., for the purpose of establishing on Tyneside a factory to produce nuclear-quality graphite. The anticipated cost of the whole project is £6,000,000 and work upon its construction is expected to start early in the New Year.

Parsons, Reyrolle, McAlpine and Clarke, Chapman are members of the Nuclear Power Plant Co., Ltd., which has submitted tenders to the Central Electricity Authority and to the South of Scotland Electricity Board for the first complete nuclear power stations to be built under the Government White Paper programme.

Christmas Decorative Lighting

Christmas shopping is now well under way and lighting schemes creating a festive atmosphere have been erected in shopping centres in many towns throughout the country. In the accompanying pictures we illustrate two examples which are proving great attractions to shoppers.

The Regent Street, London, scheme has been designed by Mr. Beverley Pick for the Regent Street Association and consists of hundreds of minaret lanterns each surrounded by a corona of glittering coloured aluminium balls and each lantern having three 150 W lamps. The main contractors for the scheme were Chrysaline, Ltd.

In Portsmouth, one of the main shopping thoroughfares is Commercial Road. Here the Street Lighting Department of the Portsmouth Sub-Area of the Southern Electricity Board has designed and installed a canopy of lights in red, green, blue and yellow, which forms a "fairy" roof over the thoroughfare. The installation has 12,000 lamps.

Canadian Transformer Order

Gresham Transformers, Ltd., has received an order for power distribution transformers to the value of $34,000 from its associate company, the Canadian Gresham Transformer Co. The order is for oil cooled outdoor types.

Pye Radio Development

Speaking at an export conference in Cambridge last week, Mr. C. O. Stanley, chairman of the Pye Group, announced that his group had produced new radio equipment which completely separated channels spaced only 15 kc/s apart. This, he claimed, was "four times better than current American practice and six times better than current British practice." It meant that some six times as many people could use radio-communication and it foreshadowed an immense development in radio-communication in all parts of the world as well as an increase in our exports.

Lamp Price Reductions

Philips Electrical, Ltd., announces that as from 3rd December the retail prices of its white "Argenta" domestic electric lamps have been reduced. The new prices (including purchase tax) are as follows: 40 W, 1s 11½d; 60 W, 1s 11½d; 100 W, 2s 6½d. From the same date the price of the Philips 150 W reflector spotlamp has been reduced to 12s 9d, including purchase tax.

Similar reductions are announced by the Stella Lamp Co., Ltd.

Thorn Electrical Industries, Ltd., announces that it has reduced the prices of its "Atlas" 250 W and 400 W MBF/U fluorescent mercury lamps to £4 19s for the 250 W lamps and £6 10s for the 400 W lamps.

"Practical Power Farming"

We have received a copy of the first issue (published on 29th November) of *Practical Power Farming*, formerly *Power Farmer*. The journal, which is published by Farmer & Stock-Breeder Publications, Ltd., Dorset House, Stamford Street, London, S.E.1, is produced in newspaper form and has 68 pages of editorial and advertising matter. It will be published monthly at a price of 1s. The circulation is part controlled and part free sale, the controlled circulation being more than 6,000 copies a month. The first issue includes a message of welcome from Mr. Heathcoat Amory, Minister of Agriculture, and among the many

Christmas lighting showing (left) the minaret lanterns in Regent Street, London, and canopy of lights over Commercial Road, Portsmouth

subjects dealt with are planned pig housing, the Smithfield Show and an electro-combine.

The last-mentioned item describes a machine developed in Denmark. It is an Ava combine fitted with a 15 h.p. electric motor and a Fordson Major tractor with an a.c. three-phase generator. The generator is a 220 V machine, rated at 15 kW. The crankshaft of the tractor has been lengthened and the belt-driven generator runs at 3,000 r.p.m., compared with the tractor's 1,500 r.p.m. A cable from the tractor supplies electricity to the combine motor. The system gives constant working of the combine. There is always a surplus of power due to the fact that the generator immediately produces more electricity if necessary during difficult harvesting conditions. The generator and the motor can be used for several purposes. The electric motor can be dismounted within five minutes, and the generator may be used as a portable power station for saws, milking machines, suction equipment for clover seed harvesting, etc.

Careers for Schoolgirls

Practical steps are being taken to encourage grammar school girls to enter upon careers in science and engineering in industry. On 24th November some thirty science mistresses from Lancashire and Cheshire schools were the guests of the Metropolitan-Vickers Electrical Co., Ltd., Trafford Park, Manchester. The party was received by Dr. Willis Jackson, director of research and education, and Mr. R. F. Marshall, manager, Education Department, who, together with their staffs, explained the company's organisation and the prospects open to girls. The mistresses then visited the Research Department, Education Department, works school and apprentice training school.

The recruitment and training of women scientists and engineers is no new thing in the company's history—the first woman graduate engineer joined the company in 1914 and professional and technician apprenticeships have long been open to girls. At present the company has three girl student apprentices on the sandwich diploma course at the Royal Technical College, Salford.

Science mistresses, interested in Metropolitan-Vickers training facilities for girls, examine an electron microscope in the company's Research Department

Representatives at the Lancashire Dynamo sales conference. In the front row, fourth from the left, is Mr. H. W. Bosworth, director of Lancashire Dynamo Holdings, and on his left is Mr. S. F. Steward, group managing director

Gas Expansion Turbines for I.C.I.

The Brush Electrical Engineering Co., Ltd., has obtained through Kellogg International, an order for six gas expansion turbines to be installed on a new chemical plant by Imperial Chemical Industries, Ltd., Billingham division. These turbines will range in output from 3,000 h.p. downwards and will be used for driving centrifugal compressors. The gas for driving the gas turbines will come from an installation of fifteen GS34 free piston gasifiers which will be supplied partly by S.I.G.M.A. in France and partly by the Free Piston Engine Co.

Lancashire Dynamo Sales Conference

Mr. S. F. Steward, C.B.E., managing director of the Lancashire Dynamo Group, at a dinner on 29th November opened a two-day group sales conference attended by senior sales staff from branches and works throughout the organisation. He pointed out the opportunity presented in the Lancashire Dynamo Group of achieving the benefits of working as a group without weakening the initiative or changing the personal character of the constituent companies. It was the duty of the sales organisation to ensure that as the group expanded its long tradition of personal service to customers was in no way diminished. In referring to the growing importance of the group, Mr. Steward mentioned the recent acquisition of J. G. Statter & Co. and pointed out that their products were complementary to those at present manufactured in the group.

"Thermovent" Wall-Chart

E. K. Cole, Ltd., has now available for stockists of "Thermovent" electrical heating equipment a wall-chart in three colours showing the complete range. It measures 15in wide by 20½in deep and is varnish finished.

B.I.C.C. Educational Awards

More than 200 students from the northern factories of British Insulated Callender's Cables, Ltd., at Prescot, Helsby and Leigh, recently received awards under the company's further education scheme. The largest of the presentation ceremonies was at Prescot, when Mr. W. H. McFadzean, chairman and managing director, presented awards to 162 successful students. The guests present included the Mayor of St. Helens, chairman of Prescot U.D.C., officials from the northern factories of the company and parents of the students.

Mr. W. H. McFadzean (chairman and managing director) presenting an award to one of the B.I.C.C. students

Mr. L. R. B. Spence, Prescot works manager, presided and welcomed the guests. After presenting the awards, Mr. McFadzean gave a short address.

A similar function, though on a smaller scale, was held at Leigh, when twenty-seven students received awards. Sir Rex Hodges, director, and Lady Hodges were present, and Lady

Hodges presented the awards. At Helsby, Mr. P. R. Dunn, chief engineer, presented awards to twenty students.

Traffic Signals in the Channel Islands

The first set of vehicle-actuated traffic signals ever to go into operation in the Channel Islands were switched on by the Constable of the Parish of St. Helier, Jersey, on 29th November. Other installations will quickly follow until the majority of major junctions in the parish are covered. Initially, sixteen sets of the latest type of "Electro-matic" vehicle - actuated signals have been ordered from the Automatic Telephone & Electric Co., Ltd.

Electronic Instruments

A wide range of electronic instruments and equipment was displayed by E.M.I. Electronics, Ltd., at an exhibition staged at the Royal Hotel, Woburn Place, London, last week. More than one hundred products, many of them new and exhibited for the first time, were to be seen both in static and operating displays in a variety of applications. There were twelve measuring oscilloscopes of four different types fed from various inputs and performing functions illustrating the versatility of these instruments, and many ancillary and sub-units available for extending their performance for a wide range of general or specialised requirements.

Among the many industrial instruments on view were two types of dynamic balancing machines, four types of stroboscopes (one fitted with a photo-electric transducer), two types of tachometers, and a vibrator and 1 kW vibrator amplifier. Other instruments included waveform analysers, microwave equipment, television cameras, recording equipment and magnetic tape, and a selection of special valves.

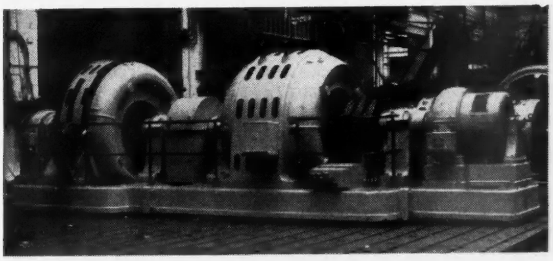
Works Visit

On 29th November members of the Shropshire Branch of the Electrical Contractors' Association visited the Oldbury works of the Simplex Electric Co., Ltd., where they were welcomed by Mr. J. D. Johnson, director. A tour was made of the foundry and the various sections of the works producing switch and distribution gear, control panels, conduit fittings, flameproof equipment, accessories, etc. A short time was also spent at the works of Tube Products, Ltd., an associated company.

Frequency Changing Equipment

A large capacity frequency changing equipment has been supplied by the Electric Construction Co., Ltd., to the Admiralty for an overseas dockyard. The set comprises screen protected type machines, direct flexibly coupled, mounted on a combination bedplate with the necessary hand railing and coupling guards. The 600 r.p.m. motor is a 2,260 b.h.p. 6·6 kV three-phase 50 c/s unity/0·9 leading power factor, synchronous induction type machine with Bibby flexible coupling for direct coupling to the 1,600 kW, 2,000 kVA, 6·6 kV, 50 c/s revolving field alternator, the output of which can be varied from 6·3 to 6·75 kV. Direct coupled exciters for both motor and alternator are fitted.

The alternator has a rocking stator to assist in future parallel running. With the set is provided a T.E. pillar type field suppression panel, a cubicle type earthing panel and control panels for the alternator and motor exciters. The set is controlled by an E.C.C. stator panel and an Allen West motor operated liquid starter. With the stator panel are provided a closing solenoid rectifier equipment and tripping battery. The Reyrolle distribution switchboard includes Merz-Price alternator protective gear. This switchboard has ring main feeder breakers and control panels for the 60 c/s supply.



E.C.C. frequency changer for the Admiralty

Calendars

The 1957 calendar received from Brook Motors, Ltd., has monthly sheets which also show the preceding and following months. Each sheet has an attractive picture of a British scene.

A colourful picture of one of the Derbyshire dales makes an excellent picture for the calendar received from the D.P. Battery Co., Ltd.

The calendar of Mavor & Coulson, Ltd., has monthly sheets with bold figures surmounted by a view of Eilean Donan and Loch Alsh.

TRADE ANNOUNCEMENTS

British Insulated Callender's Cables, Ltd., announces that as from 10th December its Tunbridge Wells office will be transferred to Water Lane, Maidstone (telephone: Maidstone 51113-4). The telephone number of the company's Swansea office is now Swansea 52094.

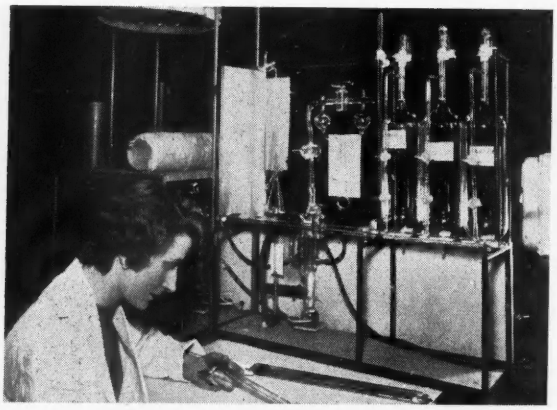
Mullard, Ltd., will shortly be moving into its new headquarters at Torrington Place, London, W.C.1. For some years now several departments of the organisation have been temporarily accommodated in a number of separate premises and the move will eventually bring all departments under one roof. The moving of the various departments will take place in stages, but all correspondence should be sent to the new address as from 8th December. The new premises will include showrooms, a demonstration centre and cinema.

G.W.B. Furnaces, Ltd., Control Gear Division, announces that agreements have been made for the following firms to represent it, in the areas mentioned, for the sale of G.W.B. l.v. control gear. This range covers from 10 to 1,400 A a.c. or d.c. motor control gear and specialised panels for all purposes:—Bawes Co., Bawes House, North Road, Bath (Mr. Kidd, M.I.E.E., telephone: Bath 61447), for South Wales, Cornwall, Devon, Somerset, Dorset, Hampshire and Gloucestershire, and the Harden Engineering Co., 7, Saville Place, Newcastle-upon-Tyne, 1 (Mr. J. G. L. Harden, A.M.I.E.E., telephone: Newcastle 29951/2), for Northumberland, Durham, Westmorland and Cumberland.

Members of the E.C.A. Shropshire Branch at the Oldbury Works of the Simplex Electric Co.

LIGHTING RESEARCH

Work of the A.E.I. Lamp & Lighting Co.



Both lamps in this picture are made of sodium-resistant glass and have been run for 3,000 hours, but the new type shows no sign of discoloration

Densitometer used to give accurate determinations of brightness from photographic negatives of street lighting installations

Pinch sealing the molybdenum foil cathode leads into quartz mercury vapour arc tubes

JUST over six months ago the A.E.I. Lamp & Lighting Co., Ltd., came into operation to market all the many different types of lamps and lighting equipment formerly distributed by the British Thomson-Houston Co., Ltd., the Edison Swan Electric Co., Ltd., and the Metropolitan-Vickers Electrical Co., Ltd. At the same time the lamp and lighting manufacturing and research facilities of all three companies were unified under the control of the British Thomson-Houston Co., Ltd.

Last week we had the opportunity of visiting Rugby to see something of the work of the two large sections of the B.T.H. research laboratories which are devoted to lamps and lighting. These sections employ a total staff of 65 and are concerned with the discovery and development of new light sources, the design and application of new lamps and lighting fittings and the study of materials and methods of construction with a view to improving quality and reducing manufacturing costs.

When we arrived at Rugby Mr. L. J. Davies, B.T.H. director of research (and also a director of the A.E.I. Lamp & Lighting Co.) stated that new engineering development laboratories were being built at Leicester adjacent to the lamp works at Melton Road. The foundations of the new building had already been laid and it was expected to be completed within about 18 months.

New materials may enable barriers to progress to be overcome. For instance, discharge lamps were made possible by aluminosilicate glasses that would stand the high temperature needed to produce the required mercury vapour pressure and sodium resistant glasses to enable sodium vapour to be used in a lamp. Research on tungsten is essential to improve the quality of incandescent lamps and phosphor is a similar basic material in fluorescent lamps. In the glass research section we saw examples of recently developed new glasses including tellurite glasses with refractive indices as high as that of a diamond, and semi-conducting vanadate glasses. We also saw gas analysis apparatus, which is being used to investigate the reactions occurring during the formation and activation of fluorescent lamp cathodes.

An essential service for much research work is the detection of minute trace impurities and their possible effects on crystal structure. The detection equipment at Rugby includes apparatus for spectrographic, X-ray and radioactive tracer tests and a special mass spectrometer one of the uses of which is for testing tungsten.

The determination of the amount of radiation from lamps in all parts of the spectrum is important for research investigations and for standardisation. Radiation measurements are made by forming a "rainbow" from each source, eliminating stray radiation by doing it twice and then collecting a small band at a time. The basis of the measurements is that on specially blackened surfaces the light can be turned into heat and the rise in temperature used to produce minute electric currents. By calibration, photo-electric cells are substituted for the blackened surfaces, and measurement of the currents from these, which are of the order of 10^{-12} A, enable the "signature" of the light source radiation to be obtained.

The British 5ft 80 W fluorescent lamp has fully shown the advantages obtainable from an increased light output from a fluorescent lamp in place of some slight gain in

Voltage stability tests on a 28 V d.c. 2½ kW xenon projector lamp

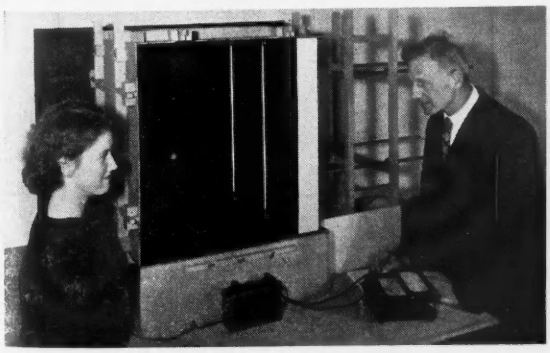
efficiency and research work has continued to try to extend loading with the minimum loss of efficiency. The recent American announcement of trial lamps was explained with diagrams and models together with alternative lamps developed in this country. The mechanism underlying the starting of fluorescent lamps has been studied and methods developed which have enabled starter switches to be dispensed with. Work on high current quartz seals has made higher power quartz lamps much more attractive and we saw several examples of lamps with pinched seals. Large high-pressure mercury fluorescent lamps are also made in this way. One interesting light source which we saw in operation was a 2½ kW 24 V d.c. xenon lamp.

After we had examined equipment for growing phosphor crystals and coating them in a vacuum, there was a demonstration of the production of light by the electroluminescence of crystals in an electric field. It showed the basic phenomenon on a large crystal and panels and a number of applications were demonstrated including the use of electroluminescence for indicating on clock faces and switch markers. Similar photo-electric crystals can control the light from such panels and show the principle of light amplification.

The impedance of a photo-conducting crystal varies with incident light; e.g. low current in darkness, and high current when exposed to light. An electroluminescent crystal emits light when subjected to an a.c. field by applying a voltage. The higher the voltage applied to the crystal, the greater the current flowing through the crystal and the greater the light output. The brightness of an electroluminescent crystal can be controlled by incident light on a photo-conducting crystal.

An electroluminescent panel can be made by sandwiching a phosphor dielectric layer between sheets of glass. One interesting research objective is a solid state image convertor made in a similar manner to a simple electroluminescent panel by using layers of crystalline material.

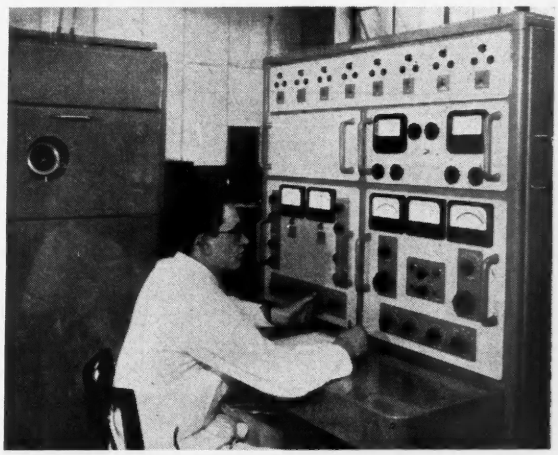
Adjustable model room into which variations in light distribution, room proportions and reflecting surfaces can be introduced



By this means a complete picture with gradation of light and shade would be reproduced at a controllable brightness. An image would be reproduced with light of equivalent or different colour, e.g. ultra-violet light to produce green light.

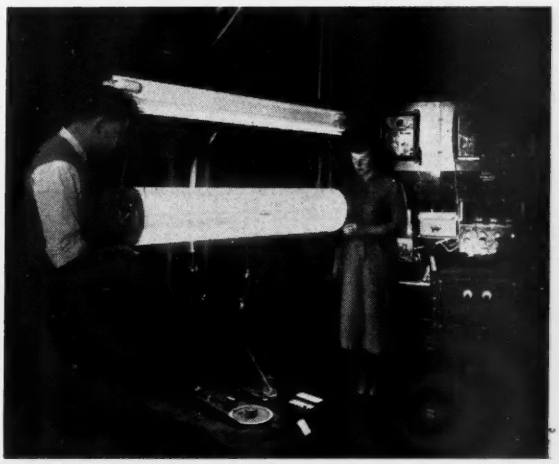
In another section of the laboratory we saw large cabinets fitted with furniture and a meal to demonstrate the relative importance of colour and colour rendering using different intensity light sources similar in colour appearance but different in rendering. We also saw a research model which is used with a view to simplifying lighting design to achieve a given brightness pattern taking into consideration reflected light from walls and ceilings with typical lighting installation layouts.

It is important in street lighting research to keep in touch with full-scale practice. Tests have been carried out with the co-operation of the Rugby Corporation in local streets and representational photographic techniques are employed for recording and studying road brightness patterns. Two lanterns were shown which have special sodium and mercury lamps giving identical light distributions and light output and made especially for the comparative study of the visibility provided by mercury and sodium lamp installations.



Mass spectrometer for the detection of minute quantities of impurities in materials

Adjusting lamp separation in a model used for determining the operating conditions in a fluorescent street lighting lantern



DOMESTIC ELECTRICAL EQUIPMENT

Immersion Heaters

AFTER thermal storage water heaters, the subject of our last survey, we now propose to deal with the immersion heater, an appliance which is generally considered to be one of the simplest, and perhaps the cheapest, methods of supplementing an existing solid-fuel water heating system by electrical methods. It can, of course, be used as the sole means of providing hot water, as indeed is the case with many installations during the summer months when the heat from a fuel-fired boiler may make the kitchen uncomfortable.

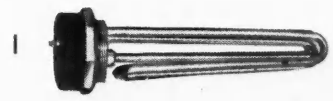
With this type of water heater, however, it is essential that the storage tank should be efficiently lagged and unnecessarily long pipe runs should be avoided, otherwise consumption may be fairly high. The average well-planned installation, using a 3 kW heater, should provide sufficient hot water for a bath within ninety minutes.

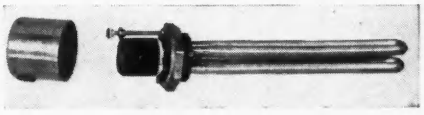
Operating on the principle that water rises when heated, the use of circulators for fitting over an existing heater provide for a speedier supply of small quantities of hot water, but these are only advised in soft water districts. The design of immersion heaters has changed little over the years and from the 25 or so manufacturers listed in the following survey models are available to cover most of the variations likely to be encountered in domestic plumbing systems. The average immersed length ranges from 10in to 36in, and in most cases provision is made for a thermostat in the form of a pocket in the heater itself.

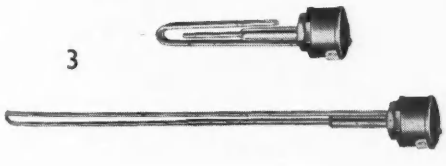
To a certain extent prices have been standardised since we last dealt with this subject and many makers now produce a standard 2 or 3 kW heater at £2 10s, plus £1 2s purchase tax in the United Kingdom. Thermostats, which are sold free of tax, are extra as also are fixing flanges, circulators, etc.

Manufacturer	Name or model	Type	Immersed length (inches)	Loading	Thermostat pocket	Size of B.S.P.T. head (inches)	Price (excl. tax)	Purchase tax
AIDAS ELECTRIC CO., LTD., Rowdell Road, Northolt, Greenford, Middlesex.	"Dumpy"	Non-withdrawable	10½ to 20	2 kW	Yes	2½	£2 5 0	£0 19 10
	"Dumpy"	Non-withdrawable	24 and 27	2 kW	Yes	2½	£2 7 6	£1 0 11
	"Dumpy"	Non-withdrawable	15 to 30	3 kW	Yes	2½	£2 7 6	£1 0 11
	"Grid"	Non-withdrawable	7¾	2 kW	Yes	1½	£2 12 6	£1 3 2
	"Grid"	Non-withdrawable	7¾	2 kW	No	1½	£2 7 6	£1 0 11
	"U2"	Non-withdrawable	10½ to 20	2 kW	No	1½	£1 18 0	£0 16 9
	"U3"	Non-withdrawable	14¾ to 30	3 kW	No	1½	£2 4 0	£0 19 5
	"UT2"	Non-withdrawable	10½ to 20	2 kW	Yes	1½	£2 5 0	£0 19 10
	"UT3"	Non-withdrawable	14¾ to 30	3 kW	Yes	1½	£2 7 6	£1 0 11
	"Spirod"	Non-withdrawable	18 to 24	2 kW	Yes	2½	£3 5 0	£1 8 8
	"Spirod"	Non-withdrawable	10⅝	3 kW	Yes	2½	£2 7 6	£1 0 11
	"Spirod"	Non-withdrawable	21 to 36	3 kW	Yes	2½	£3 10 0	£1 10 10
	"ATC2"	Withdrawable	21 to 30	2 kW	Yes	2½	£5 7 0 to £6 3 6	£2 7 1 to £2 14 5
	"ATC3"	Withdrawable	21 to 36	3 kW	Yes	2½	£5 12 6 to £7 0 0	£2 9 6 to £3 1 8
	"ATC4"	Withdrawable	27 to 36	4 kW	Yes	2½	£6 11 0 to £7 7 6	£2 17 8 to £3 4 11
	"IH"	Withdrawable	10 to 20	250 to 500 W	No	¾	£1 8 3 to £1 13 9	£0 12 6 to £0 14 11
	"PTL"	Withdrawable	10½ to 16½	1 to 2 kW	No	1½	£1 16 0 to £2 0 0	£0 15 11 to £0 17 8
BELLING & CO., LTD., Bridge Works, Southbury Road, Enfield, Middlesex.	56A	Withdrawable, horizontal	13 11/16	1½ kW	No	2in gas	£3 15 0	£1 13 0
	57	Withdrawable, horizontal	16 11/16	2 kW	No	2in gas	£4 8 0	£1 18 9
	58	Withdrawable, horizontal	24 3/16	3 kW	No	2in gas	£5 10 0	£2 8 5

Manufacturer	Name or model	Type	Immersed length (inches)	Loading	Thermostat pocket	Size of B.S.P.T. head (inches)	Price (excl. tax)	Purchase tax
BENHAM & SONS, LTD., 66, Wigmore Street, London, W.1.	5023	Non-withdrawable	5	1 kW	No	2	£4 5 0	£1 17 5
	5024	Non-withdrawable	7	1½ kW	No	2	£4 9 0	£1 19 2
	5025	Non-withdrawable	8½	2 kW	No	2	£4 12 0	£2 0 6
	5026	Non-withdrawable	11	2½ kW	No	2	£4 17 6	£2 2 11
	5027	Non-withdrawable	12½	3 kW	No	2	£5 0 0	£2 4 0
	5028	Non-withdrawable	14	3½ kW	No	2	£5 3 6	£2 5 6
	5029	Non-withdrawable	16	4 kW	No	2	£5 11 6	£2 9 1
	7113	Non-withdrawable	10½	2 kW	Yes	2	£6 0 0	£2 12 10
	7114	Non-withdrawable	10½	2¼ kW	Yes	2	£6 3 0	£2 14 2
	7115	Non-withdrawable	10½	2½ kW	Yes	2	£6 6 0	£2 15 5
	7116	Non-withdrawable	12	2¾ kW	Yes	2	£6 7 0	£2 15 10
	7117	Non-withdrawable	12	3 kW	Yes	2	£6 8 0	£2 16 4
	7118	Non-withdrawable	13¾	3¼ kW	Yes	2	£6 10 0	£2 17 2
	7119	Non-withdrawable	13¾	3½ kW	Yes	2	£6 11 6	£2 17 10
	7120	Non-withdrawable	15¾	3¾ kW	Yes	2	£6 15 0	£2 9 3
	7121	Non-withdrawable	15¾	4 kW	Yes	2	£6 18 6	£3 0 11
BERRY'S ELECTRIC, LTD., Touchbutton House, Newman Street, London, W.1.	" Bluehead "	Single loop embedded	11½ to 36	3 kW	Yes	2¼	£2 10 0	£1 2 0
	" Bluehead "	Single loop embedded	14	3 kW	No	1¼	£2 6 4	£1 0 5
	" Bluehead "	Single loop embedded	10	2 kW	No	1¼	£2 6 4	£1 0 5
	" Bluehead "	Single loop embedded	16	2 kW	No	1¼	£2 6 4	£1 0 5
C. H. BLACKBURN & CO., LTD., 10, Grays Inn Road, London, W.C.1.	" Stellex " W212H	Non-withdrawable	12	2 kW	Yes	2¼	£3 8 6	£1 10 2
	" Stellex " W221HV	Non-withdrawable	21	2 kW	Yes	2¼	£4 1 6	£1 15 11

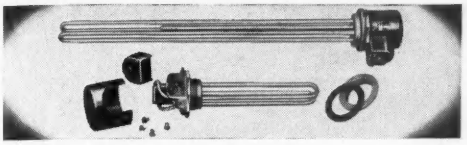






1. *Aidas 2 kW " Dumpy "*
2. *Belling type 58 horizontal model*
3. *Two of Berry's " Bluehead " range*
4. *Benham non-withdrawable type with thermostat combined*
5. *Blackburn W312H " Stellex " heater*

Manufacturer	Name or model	Type	Immersed length (inches)	Loading	Thermostat pocket	Size of B.S.P.T. head (inches)	Price (excl. tax)	Purchase tax
C. H. BLACKBURN & CO., LTD., 10, Grays Inn Road, London, W.C.1. *(continued)*	"Stellex" W312H	Non-withdrawable	12	3 kW	Yes	2½	£3 15 0	£1 13 0
	"Stellex" W321HV	Non-withdrawable	21	3 kW	Yes	2½	£4 9 0	£1 19 2
GEO. BRAY & CO., LTD., Leicester Place, Blackman Lane, Leeds, 2.	"Tubalox" LAMS	Double element, non-withdrawable	11⅛	2 kW	Yes	2½	£4 9 6	£2 1 4
	"Tubalox" LAMS	Double element, non-withdrawable	13⅛ to 18	2 or 3 kW	Yes	2½	£4 19 6	£2 6 0
	"Tubalox" LAMS	Double element, non-withdrawable	21 to 42	2 or 3 kW	Yes	2½	£4 19 6	£2 6 0
	"Tubalox" LAQD	Single element, non-withdrawable	11⅛	2 kW	Yes	2½	£2 10 0	£1 2 0
	"Tubalox" LAQD	Single element, non-withdrawable	13⅛ to 18	2 or 3 kW	Yes	2½	£2 10 0	£1 2 0
	"Tubalox" LAQD	Single element, non-withdrawable	21 to 30	2 or 3 kW	Yes	2½	£2 10 0	£1 2 0
BRITISH NATIONAL ELECTRICS, LTD., Newarthill, Motherwell, Scotland.	B.N.E.	Non-withdrawable	11 to 36	3 kW	Yes	2⅞	£2 10 0	£1 2 0
	B.N.E.	Withdrawable	24	2 kW	Yes	2⅞	£4 17 0	£2 2 7
	B.N.E.	Withdrawable	26	2 kW	Yes	2⅞	£5 2 0	£2 4 9
	B.N.E.	Withdrawable	28	2 kW	Yes	2⅞	£5 6 0	£2 6 6
	B.N.E.	Withdrawable	30	2 kW	Yes	2⅞	£5 10 0	£2 8 3
	B.N.E.	Withdrawable	30	3 kW	Yes	2⅞	£5 15 0	£2 10 6
	B.N.E. Dual Service	Withdrawable	24	2 or 3 kW	Yes	2⅞	£3 10 0	£1 10 9
	B.N.E. Dual Service	Withdrawable	28	2 or 3 kW	Yes	2⅞	£3 10 0	£1 10 9
	B.N.E. 19 Outfit	Non-withdrawable, Side Entry Circulator	13	2 kW	Yes	2⅞	£5 10 0	£1 15 1
	B.N.E. 20 Outfit	Non-withdrawable, Side Entry Circulator	17	3 kW	Yes	2⅞	£6 5 0	£2 1 8
BULPITT & SONS, LTD., St. George's Works, Icknield Street, Birmingham, 18.	311HV and 314HV	Non-withdrawable Shallow Head	11 and 14	3 kW	Yes	2½	£2 10 0	£1 2 0
	318HV and 321HV	Non-withdrawable Shallow Head	18 and 21	3 kW	Yes	2½	£2 10 0	£1 2 0
	324HV and 327V	Non-withdrawable, Shallow Head	24 and 27	3 kW	Yes	2½	£2 10 0	£1 2 0
	330V and 336V	Non-withdrawable Shallow Head	30 and 36	3 kW	Yes	2½	£2 10 0	£1 2 0
CONTROLLED HEATING UNITS (LONDON), LTD., Avenue Road, Hampton, Middlesex.	"Rubicon" PN	Non-withdrawable	12 and 16	2 kW	No	2½	£2 10 0	£1 2 0
	"Rubicon" PN	Non-withdrawable	21 to 30	2 kW	No	2½	£2 15 0	£1 4 2
	"Rubicon" PN	Non-withdrawable	36	2 kW	No	2½	£3 0 0	£1 6 4
	"Rubicon" PN	Non-withdrawable	16	3 kW	No	2½	£2 10 0	£1 2 0
	"Rubicon" PN	Non-withdrawable	21 to 30	3 kW	No	2½	£2 15 0	£1 4 2
	"Rubicon" PN	Non-withdrawable	36	3 kW	No	2½	£3 0 0	£1 6 4
	"Rubicon" MBX	Non-withdrawable	12 and 16	2 kW	Yes	2½	£2 15 0	£1 4 2
	"Rubicon" MBX	Non-withdrawable	21 to 30	2 kW	Yes	2½	£3 0 0	£1 6 4
	"Rubicon" MBX	Non-withdrawable	36	2 kW	Yes	2½	£3 5 0	£1 8 6
	"Rubicon" MBX	Non-withdrawable	12 and 16	3 kW	Yes	2½	£2 15 0	£1 4 2



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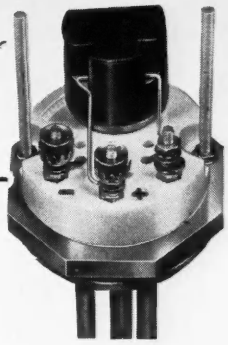

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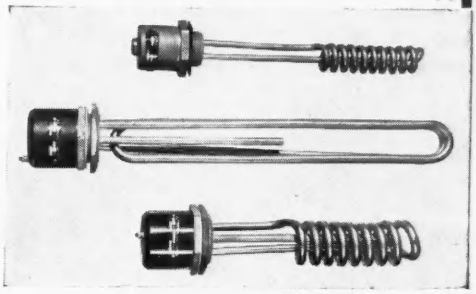

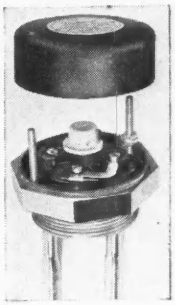

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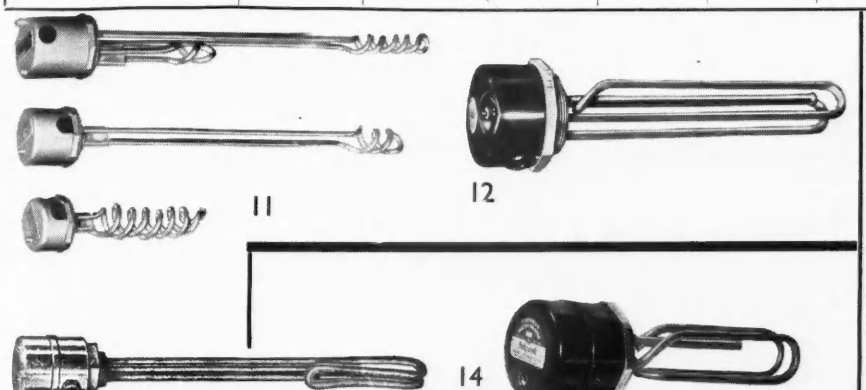
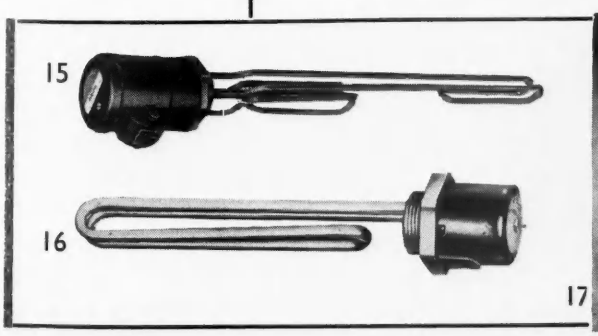
6. *Geo. Bray "Tubalox" type LAMS*
7. *Falk, Stadelmann U.95641 heater*
8. *Head of the Controlled Heating Units "Rubicon" type PN*
9. *Head of the B.N.E. heater*
10. *Range of Eltron domestic heaters*

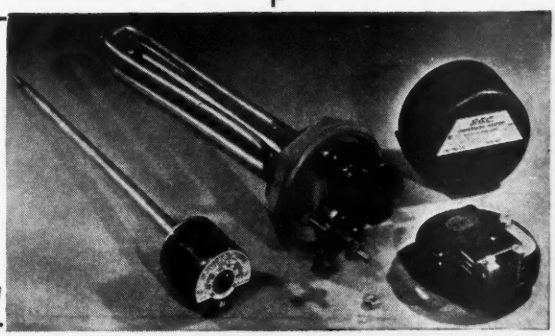
Manufacturer	Name or model	Type	Immersed length (inches)	Loading	Thermostat pocket	Size of B.S.P.T. head (inches)	Price (excl. tax)	Purchase tax
CONTROLLED HEATING UNITS (LONDON), LTD., Avenue Road, Hampton, Middlesex. *(continued)*	"Rubicon" MBX	Non-withdrawable	21 to 30	3 kW	Yes	2½	£3 0 0	£1 6 4
	"Rubicon" MBX	Non-withdrawable	36	3 kW	Yes	2½	£3 5 0	£1 8 6
	"Rubicon" NA	Non-withdrawable	12 and 16	2 kW	No	1½	£2 15 0	£1 4 2
	"Rubicon" NA	Non-withdrawable	21 to 30	2 kW	No	1½	£3 0 0	£1 6 4
	"Rubicon" NA	Non-withdrawable	36	2 kW	No	1½	£3 5 0	£1 8 6
	"Rubicon" NA	Non-withdrawable	12 and 16	3 kW	No	1½	£2 15 0	£1 4 2
	"Rubicon" NA	Non-withdrawable	21 to 30	3 kW	No	1½	£3 0 0	£1 6 4
	"Rubicon" NA	Non-withdrawable	36	3 kW	No	1½	£3 5 0	£1 8 6
ELTRON (LONDON), LTD., Accrington Works, Strathmore Road, Croydon, Surrey.	D.201	Non-withdrawable	14, 17 and 20	2 kW	Yes	1½	£2 12 6	£1 3 7
	D.202	Non-withdrawable	14, 17 and 20	2 kW	Yes	2½	£2 17 6	£1 5 10
	D.301	Non-withdrawable	18, 24 and 30	3 kW	Yes	1½	£3 10 6	£1 11 9
	D.302	Non-withdrawable	18, 24 and 30	3 kW	Yes	2½	£3 15 6	£1 14 0
FALK, STADELMANN & CO., LTD., 91, Farringdon Road, London, E.C.1.	U.95641	Non-withdrawable	12	2 kW	Yes	2½	£2 7 0	£1 0 8
	U.95641	Non-withdrawable	12 and 18	3 kW	Yes	2½	£2 14 0 (12) £3 3 0 (18)	£1 3 9 (12) £1 7 8 (18)
	U.95641	Non-withdrawable	24 and 27	3 kW	Yes	2½	£3 10 0 (24) £3 15 0 (27)	£1 10 9 (24) £1 12 11 (27)
FERRANTI, LTD., Domestic Appliance Dept., Moston, Manchester, 10.	—	Non-withdrawable	12	2 kW	Yes	2½	£3 13 11	£1 12 6
	—	Non-withdrawable	28	2 kW	Yes	2½	£5 5 8	£2 6 6
	—	Non-withdrawable	22	3 kW	Yes	2½	£5 4 1	£2 6 0
	—	Non-withdrawable	28	3 kW	Yes	2½	£5 16 9	£2 11 5

Manufacturer	Name or model	Type	Immersed length (inches)	Loading	Thermostat pocket	Size of B.S.P.T. head (inches)	Price (excl. tax)	Purchase tax
G.B.M. (ELECTRICAL) BIRMINGHAM, LTD., 439, Moseley Road, Birmingham, 12.	" Black Head " D	Non-withdrawable	10 to 27	2 kW	Yes	1¼	£2 10 0	£1 2 0
	" Black Head " B	Non-withdrawable	11 to 29	3 kW	Yes	2¼	£2 14 8	£1 4 0
	" Big Head " A	Withdrawable	10 to 42	2 kW	Yes	2¼	£4 7 6 to £5 17 6	£1 18 5 to £2 11 7
	" Big Head " A	Withdrawable	10 to 42	3 kW	Yes	2¼	£5 0 0 to £7 5 0	£2 3 9 to £3 3 6
	" Big Head " A	Withdrawable	12 to 42	4 kW	Yes	2¼	£6 0 0 to £8 14 0	£2 12 6 to £3 16 2
GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2.	DE2000	Sheathed wire	10½	2 kW	No	1¼	£2 6 3	£1 0 4
	DE2111 DE2118 DE2123 DE2127 DE2130	Sheathed wire	11 to 30	2 kW	Yes	2¼	£2 10 0	£1 2 0
	DE3000	Sheathed wire	14½	3 kW	No	1¼	£2 6 3	£1 0 4
	DE3111 DE3118 DE3123 DE3127 DE3130	Sheathed wire	11 to 30	3 kW	Yes	2¼	£2 10 0	£1 2 0
	DE2123A DE2127A DE2130A	Dual-service Sheathed wire	23 to 30	1 and 2 kW	Yes	2¼	£4 0 0	£1 15 1
GILLOTT ELECTRO-APPLIANCES, LTD., Cotswold Works, Chalford, Nr. Stroud, Glos.	" Duo Coil "	N.H.10	10	2 kW	No	1¼	£2 5 8	£1 0 0
	" Duo Coil "	H.14	14	2·5 kW	Yes	1¼	£2 6 6	£1 0 5
	" Duo Coil "	V.24	24	3 kW	Yes	1¼	£2 7 6	£1 0 10
	" Duo Coil "	V.27	27	3 kW	Yes	1¼	£2 7 6	£1 0 10
	" Duo Coil "	V.30	30	3 kW	Yes	1¼	£2 10 0	£1 2 0
	" Duo Coil "	V.36	36	3 kW	Yes	1¼	£2 12 6	£1 3 0
	" Duo Coil "	H.12A	11½	3 kW	Yes	2¼	£2 7 6	£1 0 10
	" Duo Coil "	V.24A	24	3 kW	Yes	2¼	£2 10 0	£1 2 0
	" Duo Coil "	V.27A	27	3 kW	Yes	2¼	£2 10 0	£1 2 0
	" Duo Coil "	V.30A	30	3 kW	Yes	2¼	£2 10 0	£1 2 0
	" Duo Coil "	V.36A	36	3 kW	Yes	2¼	£2 15 0	£1 4 2
	" Duo Coil "	T.V.24	24	3·75 kW	Yes	2¼	£4 15 0	£2 1 8
	" Duo Coil "	T.V.27	27	3·75 kW	Yes	2¼	£4 15 0	£2 1 8
	" Duo Coil "	T.V.30	30	3·75 kW	Yes	2¼	£4 15 0	£2 1 8
	" Duo Coil "	T.V.36	36	3·75 kW	Yes	2¼	£4 15 0	£2 1 8
GRUBB ENGINEERING CO., LTD., Mary Street, Birmingham, 12.	" Grubb "	Withdrawable	11 to 42	3 kW	Yes	2¼	£4 15 0 to £8 5 0	£2 1 8 to £3 12 5
	" Grubb "	Withdrawable	11 to 42	2 kW	Yes	2¼	£4 10 0 to £7 10 0	£1 19 6 to £3 5 9
	" Grubb "	Withdrawable	16 to 42	4 kW	Yes	2¼	£6 5 0 to £8 16 0	£2 14 10 to £3 17 3
	" Grubb "	Embedded	11 to 30	2 or 3 kW	Yes	2¼	£2 9 4	£1 1 8
HEATRAE, LTD., Heatrae Works, Norwich.	" Slimrod "	Embedded	11	2 kW	Yes	2¼	£2 9 8	£1 1 10
	" Slimrod "	Embedded	12	3 kW	Yes	2¼	£2 9 8	£1 1 10
	" Slimrod "	Embedded	21 to 30	3 kW	Yes	2¼	£2 9 8	£1 1 10
HOTPOINT ELECTRIC APPLIANCE CO., LTD., Crown House, Aldwych, London, W.C.2.	A	A2010 (double blade)	10	2 kW	No	1¼	£2 10 0	£1 2 0
	A	AA2010 (single blade)	10	2 kW	No	1¼	£2 7 6	£1 0 11
	B	BB3010	10	3 kW	No	2	£2 17 6	£1 5 3
	A	A3014 (double blade)	14	3 kW	No	1¼	£2 12 6	£1 3 1
	A	AA3014 (single blade)	14	3 kW	No	1¼	£2 10 0	£1 2 0
	B	B4018	18	4 kW	No	2	£3 15 0	£1 13 0
	CD	CD2010	10	2 kW	Yes	2¼	£2 9 8	£1 1 10
	CD	CD2027*	27	2 kW	Yes	2¼	£2 10 0	£1 2 0

Manufacturer	Name or model	Type	Immersed length (inches)	Loading	Thermostat pocket	Size of B.S.P.T. head (inches)	Price (excl. tax)	Purchase tax
HOTPOINT ELECTRIC APPLIANCE CO., LTD., Crown House, Aldwych, London, W.C.2. *(continued)*	CD	CD2510	10	2½ kW	Yes	2½	£2 10 0	£1 2 0
	CD	CD2527*	27	2½ kW	Yes	2½	£2 10 0	£1 2 0
	CD	CD3010	10	3 kW	Yes	2½	£2 10 0	£1 2 0
	CD	CD3027*	27	3 kW	Yes	2½	£2 10 0	£1 2 0
	CD	CD3030	30	3 kW	Yes	2½	£2 10 0	£1 2 0
	CD	CD3036	36	3 kW	Yes	2½	£2 10 0	£1 2 0
	CF	CF2010	10	2 kW	Yes	2½	£2 9 8	£1 1 10
	CF	CF2027*	27	2 kW	Yes	2½	£2 10 0	£1 2 0
	CF	CF2510	10	2½ kW	Yes	2½	£2 10 0	£1 2 0
	CF	CF2527*	27	2½ kW	Yes	2½	£2 10 0	£1 2 0
	CF	CF3010	10	3 kW	Yes	2½	£2 10 0	£1 2 0
	CF	CF3027*	27	3 kW	Yes	2½	£2 10 0	£1 2 0
	CF	CF3030	30	3 kW	Yes	2½	£2 10 0	£1 2 0
	CF	CF3036	36	3 kW	Yes	2½	£2 10 0	£1 2 0
	"Twinimerser"	CH20/3027 Dual purpose	10 and 27	2 and 3 kW	—	2½	£5 5 0	£2 6 1
	"Twinimerser"	CH20/3036* Dual purpose	10 and 36	2 and 3 kW	—	2½	£5 5 0	£2 6 1
	* These heaters may be formed on site to intermediate lengths between 18 and 27in. CH20/3036 heater may be bent back to intermediate lengths between 24 and 36in							
H. D. HOWDEN, 31a, Coronation Road, New Stevenston, Motherwell, Lanarkshire.	"Howden" 10	Non-withdrawable	11	1 kW	No	1¼	£2 12 6	£1 3 1
	"Howden" 15	Non-withdrawable	11	1½ kW	No	1¼	£2 15 0	£1 4 1
	"Howden" 20	Non-withdrawable	11	2 kW	No	1¼	£2 17 6	£1 5 3
	"Howden" 30	Non-withdrawable	15	3 kW	No	1¼	£3 15 0	£1 12 11
	"Howden" 40	Non-withdrawable	19	4 kW	No	1¼	£4 9 9	£1 19 5
	"Howden" 45C	Non-withdrawable	21	4½ kW	No	2½	£5 10 0	£2 8 3







11. *Three of the Gillott "Duo-Coil" range of heaters*
12. *Heatrae "Slimrod" heater*
13. *Grubb embedded type heater*
14. *Hotpoint type CD heater*
15. *Hotpoint "Twinimerser" dual-purpose model*
16. *G.E.C. DE2000 10½in heater*
17. *G.E.C. 3 kW heater with the three types of thermostat that can be employed with it*

Manufacturer	Name or model	Type	Immersed length (inches)	Loading	Thermostat pocket	Size of B.S.P.T. head (inches)	Price (excl. tax)	Purchase tax
H. D. HOWDEN, 31a, Coronation Road, New Stevenston, Motherwell, Lanarkshire. *(continued)*	"Howden" 60C	Non-withdrawable	21	6 kW	No	2½	£6 18 6	£3 0 9
	"Howden" SS10	Non-withdrawable	11	1 kW	Yes	2½	£4 3 0	£1 16 5
	"Howden" SS20	Non-withdrawable	11	2 kW	Yes	2½	£4 7 6	£1 18 5
	"Howden" SS30	Non-withdrawable	11 or 15	3 kW	Yes	2½	£5 5 9	£2 6 5
	"Howden" SS40	Non-withdrawable	15 or 19	4 kW	Yes	2½	£6 0 0	£2 12 8
	"Howden" SO1	Non-withdrawable, Side entry	12	1 kW	Yes	Bolt-on type	£3 6 9	£1 9 4
	"Howden" SO2	Non-withdrawable, Side entry	12	2 kW	Yes	Bolt-on type	£3 9 9	£1 10 8
	"Howden" SO3	Non-withdrawable, Side entry	16	3 kW	Yes	Bolt-on type	£4 11 9	£2 0 4
	"Howden" SO4	Non-withdrawable, Side entry	17	4 kW	Yes	Bolt-on type	£5 14 0	£2 10 0
	"Howden" S216-30	Non-withdrawable	16 to 30	2 kW	Yes	2½	£4 0 0	£1 15 2
	"Howden" S316-36	Non-withdrawable	16 to 36	3 kW	Yes	2½	£4 0 0	£1 15 2
	"Howden" S420-36	Non-withdrawable	20 to 36	4 kW	Yes	2½	£6 0 0	£2 12 8
DUNCAN LOW, LTD., 299, Bell Street, Glasgow, C.4.	76	Vertical	11 to 16	2 kW	Yes	2½	£2 17 4	£1 5 3
	76	Vertical	16 to 30	3 kW	Yes	2½	£3 1 9	£1 7 2
	120	Circulator, side fixing	12	2 kW	Yes	Oval flange	£3 9 10	£1 10 9
	130	Circulator, side fixing	16	2kW	Yes	Oval flange	£4 11 11	£2 0 6
METWAY ELECTRICAL INDUSTRIES, LTD., Canning Street, Kemp Town, Brighton, 7.	EWH113	Embedded	11	3 kW	Yes	2½	£2 19 6	£1 5 9
	EWH143	Embedded	14	3 kW	Yes	2½	£3 1 0	£1 6 5
	EWH183	Embedded	18	3 kW	Yes	2½	£3 2 0	£1 6 10
	EWH243	Embedded	24	3 kW	Yes	2½	£3 3 0	£1 7 3
	EWH273	Embedded	27	3 kW	Yes	2½	£3 4 0	£1 7 9
	EWH303	Embedded	30	3 kW	Yes	2½	£3 5 0	£1 8 2
MITCHELL ELECTRIC, LTD., 88-90, Tennant Street, Birmingham, 15	IG/14	Embedded	14	3 kW	Yes	2½	£2 9 2	£1 2 2
	IG/18	Embedded	18	3 kW	Yes	2½	£2 11 9	£1 3 4
	IG/24, IG/27 and IG/30	Embedded	24, 27 and 30	3 kW	Yes	2½	£2 14 2	£1 4 5
	IR/14	Withdrawable	14	3 kW	Yes	2½	£5 3 10	£2 6 9
	IR/18	Withdrawable	18	3 kW	Yes	2½	£5 7 6	£2 8 5
	IR/24	Withdrawable	24	3 kW	Yes	2½	£6 0 6	£2 14 2
	IR/27	Withdrawable	27	3 kW	Yes	2½	£6 9 2	£2 18 1
	IR/30	Withdrawable	30	3 kW	Yes	2½	£6 13 6	£3 0 0
REMPLOY, LTD., 25-28, Buckingham Gate, London, S.W.1.	MH7/1	Non-withdrawable, Sheathed	12	2½ kW	Yes	2½	£2 9 0	£1 1 6
	MH7/2	Non-withdrawable, Sheathed	14	3 kW	Yes	2½	£2 10 0	£1 1 11
SANTON, LTD., Somerton Works, Newport, Mon.	IR/112	"R"	12	1 kW	Yes	2½	£4 4 6	£1 17 2
	IR/212	"R"	12	2 kW	Yes	2½	£4 14 0	£2 1 4
	IR/218	"R"	18	2 kW	Yes	2½	£5 8 0	£2 7 6
	IR/221	"R"	21	2 kW	Yes	2½	£5 15 0	£2 10 7
	IR/227	"R"	27	2 kW	Yes	2½	£6 9 0	£2 16 9
	IR/230	"R"	30	2 kW	Yes	2½	£6 16 0	£2 19 10
	IR/312	"R"	12	3 kW	Yes	2½	£5 5 6	£2 6 5
	IR/318	"R"	18	3 kW	Yes	2½	£5 19 0	£2 12 4
	IR/321	"R"	21	3 kW	Yes	2½	£6 6 0	£2 15 5
	IR/324	"R"	24	3 kW	Yes	2½	£6 13 0	£2 18 6
	IR/327	"R"	27	3 kW	Yes	2½	£7 0 0	£3 1 7

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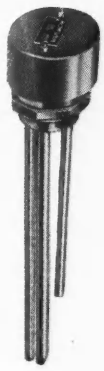

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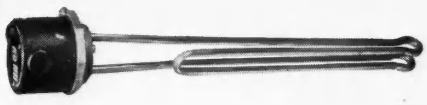

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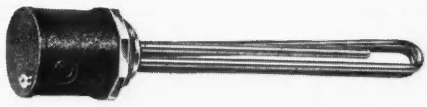

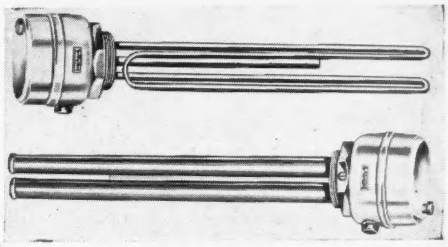

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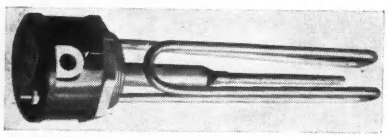
18. *Howden automatic type heater*
19. *Santon " Otter " control immersion heater*
20. *Santon " Dual " Q type*
21. *Duncan Low fixed element type*
22. *Mitchell withdrawable and embedded type heaters*

Manufacturer	Name or model	Type	Immersed length (inches)	Loading	Thermostat pocket	Size of B.S.P.T. head (inches)	Price (excl. tax)	Purchase tax
SANTON, LTD., Somerton Works, Newport, Mon. *(continued)*	IR/330	" R "	30	3 kW	Yes	2½	£7 6 6	£3 4 6
	IR/336	" R "	36	3 kW	Yes	2½	£8 0 0	£3 10 5
	IR/342	" R "	42	3 kW	Yes	2½	£8 13 6	£3 16 4
	IR/418	" R "	18	4 kW	Yes	2½	£7 1 0	£3 2 0
	IR/424	" R "	24	4 kW	Yes	2½	£7 15 0	£3 8 3
	IR/427	" R "	27	4 kW	Yes	2½	£8 2 0	£3 11 3
	IR/442	" R "	42	4 kW	Yes	2½	£9 16 0	£4 6 3
	EQ211	" Beaver "	11	2 kW	Yes	2½	£2 10 0	£1 2 0
	EQ218	" Beaver "	18	2 kW	Yes	2½	£2 10 0	£1 2 0
	EQ223	" Beaver "	23	2 kW	Yes	2½	£2 10 0	£1 2 0
	EQ227	" Beaver "	27	2 kW	Yes	2½	£2 10 0	£1 2 0
	EQ230	" Beaver "	30	2 kW	Yes	2½	£2 10 0	£1 2 0
	EQ311	" Beaver "	11	3 kW	Yes	2½	£2 10 0	£1 2 0
	EQ318	" Beaver "	18	3 kW	Yes	2½	£2 10 0	£1 2 0
	EQ323	" Beaver "	23	3 kW	Yes	2½	£2 10 0	£1 2 0
	EQ327	" Beaver "	27	3 kW	Yes	2½	£2 10 0	£1 2 0
	EQ330	" Beaver "	30	3 kW	Yes	2½	£2 10 0	£1 2 0
	EQ336	" Beaver "	36	3 kW	Yes	2½	£2 12 6	£1 3 1
	EQ416	" Beaver "	16	4 kW	Yes	2½	£3 2 6	£1 7 6
	EQ421	" Beaver "	21	4 kW	Yes	2½	£3 2 6	£1 7 6
	EQ436	" Beaver "	36	4 kW	Yes	2½	£3 4 9	£1 8 6
	IQ/3011H	" Otter "	11	3 kW	Yes	2½	£2 10 0	£1 2 0
	IQ/3018HV	" Otter "	18	3 kW	Yes	2½	£2 10 0	£1 2 0
	IQ/3023V	" Otter "	23	3 kW	Yes	2½	£2 10 0	£1 2 0
	IQ/3027V	" Otter "	27	3 kW	Yes	2½	£2 10 0	£1 2 0
	IQ/3030V	" Otter "	30	3 kW	Yes	2½	£2 10 0	£1 2 0
	IQ/3036V	" Otter "	36	3 kW	Yes	2½	£2 12 6	£1 3 1
	IQ/4016	" Otter "	16	4 kW	Yes	2½	£3 2 6	£1 7 6
	IQ/4036	" Otter "	36	4 kW	Yes	2½	£3 4 9	£1 8 6
	DUO-IQ 1×323	Dual	10 and 23	1 kW and 3 kW	Yes	2½	£5 5 0	£2 6 3
	DUO-IQ 1×327	Dual	10 and 27	1 kW and 3 kW	Yes	2½	£5 5 0	£2 6 3
	DUO-IQ 1×330	Dual	10 and 30	1 kW and 3 kW	Yes	2½	£5 5 0	£2 6 3
	DUO-IQ 1×336	Dual	10 and 36	1 kW and 3 kW	Yes	2½	£5 15 0	£2 10 7
	DUO-IQ 1×342	Dual	10 and 42	1 kW and 3 kW	Yes	2½	£5 15 0	£2 10 7
	WIQ/210	" Q "	10	2 kW	No	1½	£2 6 6	£1 0 6
	WIQ/312	" Q "	12	3 kW	No	1½	£2 6 6	£1 0 6
	WIQ/216	" Q "	16	2 kW	No	1½	£2 6 6	£1 0 6
	IQ/410	" Q "	10	4 kW	Yes	2½	£4 18 6	£2 3 4

Manufacturer	Name or model	Type	Immersed length (inches)	Loading	Thermostat pocket	Size of B.S.P.T. head (inches)	Price (excl. tax)	Purchase tax
SIMPLEX ELECTRIC CO., LTD., Creda Works, Blythe Bridge, Staffs.	"Creda Redhead" 138/51DD and 138/52DD	Embedded	11½ and 14	3 kW	Yes	2¼	£2 10 0	£1 2 0
	"Creda Redhead" 138/56DD	Embedded	18	3 kW	Yes	2¼	£2 10 0	£1 2 0
	"Creda Redhead" 138/53DD and 138/54DD	Embedded	24 and 27	3 kW	Yes	2¼	£2 10 0	£1 2 0
	"Creda Redhead" 138/55DD and 138/57DD	Embedded	30 and 36	3 kW	Yes	2¼	£2 10 0	£1 2 0
	137/95	Embedded	14	3 kW	No	1¼	£2 6 4	£1 0 5
	137/96 and 137/97	Embedded	10 and 16	2 kW	No	1¼	£2 6 4	£1 0 5
SPERRYN & CO., LTD., Moorsom Street Works, Birmingham, 6.	J.46	Withdrawable	7⅛	250 W	No	1½	£2 14 10	£1 4 1
	J.47	Withdrawable	9	400 W	No	1½	£2 19 1	£1 6 0
	J.48	Withdrawable	9	500 W	No	1½	£2 19 1	£1 6 0
	J.49	Withdrawable	9	600 W	No	1½	£3 0 11	£1 6 10
	J.52	Withdrawable	10⅛	750 W	No	1½	£3 4 4	£1 8 4
	J.2	Withdrawable	12	1 kW	No	1½	£3 8 7	£1 10 2
	J.4	Withdrawable	15⅛	1½ kW	No	1½	£3 12 3	£1 11 2
	J.6	Withdrawable	17	2 kW	No	1½	£3 19 7	£1 15 0
	J.11	Withdrawable	7⅛	250 W	No	1¾	£2 2 2	£0 18 6
	J.13	Withdrawable	9	400 W	No	1¾	£2 5 5	£1 0 0
	J.15	Withdrawable	9	500 W	No	1¾	£2 5 5	£1 0 0
	J.17	Withdrawable	10⅛	600 W	No	1¾	£2 6 11	£1 0 8
	J.19	Withdrawable	12⅛	750 W	No	1¾	£2 9 6	£1 1 9
	J.21	Withdrawable	15⅛	1 kW	No	1¾	£2 12 1	£1 2 11
	J.23	Withdrawable	17	1½ kW	No	1¾	£3 4 2	£1 8 3
	J.25	Withdrawable	20⅛	2 kW	No	1¾	£3 11 6	£1 11 6



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23. *Simplex Creda "Redhead" 11½in model*

24. *Sperryn withdrawable type heater*

CATALOGUES AND LISTS

CABLE GLANDS.—Catalogue giving particulars of the H.P.L. compression type cable glands designed for colliery, shipyard, and other industrial uses.—**Electricals, Ltd.,** 14, Claremont Place, Newcastle upon Tyne, 2.

CABLES.—Folders (EN.212) dealing with ship wiring cables and (EN.211) covering medium rubber insulated flexible cords.—**Enfield Cables, Ltd.,** Victoria House, Southampton Row, London, W.C.1.

CABLE TRUNKING.—Illustrated brochure on "Meico" industrial cable trunking.—**Micramatic, Ltd.,** 727-729, Christchurch Road, Boscombe, Bournemouth.

CERAMICS.—16-page brochure describing the manufacture of barium titanate transducers and piezo-electric ceramics and giving particulars of the characteristics and applications of these products.—**Technical Ceramics, Ltd.,** Wood Burcote Way, Towcester, Northants.

CHAINS.—66-page illustrated catalogue describing the range of Krafft & Schüll chains, including chandelier and jack chains, available from the British distributors.—**Walter Logan & Co., Ltd.,** 34, Oak Tree Drive, Totteridge, London, N.20.

CONDUIT FITTINGS.—Leaflet describing a switch or socket box designed for use in dry partition walls.—**F. C. Blackwell & Co., Ltd.,** Great Crosby Works, Liverpool, 23.

DOMESTIC APPLIANCES.—124-page catalogue (480/57) giving particulars and prices of the range of domestic electrical equipment available from the company.—**Wholesale Fittings Co., Ltd.,** 46-52, Commercial Street, London, E.1.

ENERGY REGULATOR.—Leaflet describing the "Statotherm" energy regulator designed for the control of industrial heating appliances rated up to 2 kW.—**Stabilag Co., Ltd.,** Mark Road, Hemel Hempstead, Herts.

JUNCTION BOXES.—Illustrated folder (1300/1) describing a range of light current junction boxes for telephone, public address and signalling systems, etc.—**Automatic Telephone & Electric Co., Ltd.,** Strowger Works, Liverpool, 7.

LIFTING EQUIPMENT. — Descriptive brochure on the "Lo-Hed" range of electric hoists.—**Taylor Stoker Co., Ltd.,** 189/191, Drummond Street, Euston, London, N.W.1.

LIGHTING FITTINGS.—Leaflet describing the "Lyndhurst" twin lamp fluorescent lighting fitting designed for use in the domestic kitchen, etc.—**Micramatic, Ltd.,** 727-729, Christchurch Road, Boscombe, Bournemouth.

Brochure illustrating a range of wrought iron lighting fittings and a leaflet showing contemporary floor standard lamps produced by the company.—**Philip S. Schulman, Ltd.,** 72-76, Laindon Road, Rusholme, Manchester, 14.

Broadsheet (AF 124) and two folders (AF 101 and AF 112) illustrating and describing various fluorescent lighting fittings in the company's range.—**A.E.I. Lamp & Lighting Co., Ltd.,** Crown House, Aldwych, London, W.C.2.

32-page catalogue dealing with the Holophane range of industrial lighting fittings.—**Holophane, Ltd.,** Elverton Street, S.W.1.

GENERATION AND DEVELOPMENT

C.E.A. Contracts

Contracts have been placed by the Central Electricity Authority during the past month for power stations, transforming stations and transmission lines, amounting in the aggregate to £5,595,675. The principal contracts include the following:—

Brunswick Wharf power station, Poplar: Civil engineering works for conversion to oil firing.—Peter Lind & Co.

Northfleet power station: Circulating water pipework and valves.—Aiton & Co.

Plymouth "B" power station: Conversion of three 320,000 lb/hr boilers to oil firing.—Yarrow & Co.

Rugeley power station: Civil engineering and building works.—J. L. Keir & Co.

Uskmouth "A" power station, Newport: Extension to 132 kV switch house.—John Morgan (Builders). 11 kV, 750 MVA switchgear.—General Electric Co. 132 kV cable diversions.—Pirelli-General Cable Works.

Skelton Grange "B" power station, Leeds: High pressure pipework and valves.—Aiton & Co.

Connah's Quay "B" substation: Site and foundation works.—A. Monk & Co.

Pyle substation: 275 kV isolators and 132 kV switchgear.—English Electric Co.

Hams Hall substation: 275 kV and 132 kV switchgear.—A. Reyrolle & Co.

Leicester substation: 132 kV switchgear.—General Electric Co.

Uskmouth substation: 275 kV switchgear.—Ferguson Pailin.

Chesterfield substation: Two 45 MVA, 132/33 kV transformers.—G.E.C.

Annesley substation: Two 45 MVA, 132/33 kV transformers.—B.T.H. Co.

Northfleet West substation: Four 120 MVA, 275/132 kV transformers.—Fuller Electrical and Manufacturing Co.

Penn, Hinksford, Dudley, Round Oak and Bartley Green substation: Pilot cables.—Midlands Electricity Board.

Christchurch substation: One 45 MVA, 132/33 kV transformer.—Hackbridge & Hewittic Electric Co.

Uskmouth-Newport and Uskmouth-Lydney: 132 kV overhead line.—Clough Smith & Co.

Carmarthen-Rhos: 132 kV overhead line.—Riley & Neate.

Site for Third C.E.A. Nuclear Station

It is announced that the Central Electricity Authority has chosen a site at Inkley Point in Somerset for its third nuclear power station, investigations having shown it to be admirably suited to the purpose. The decision follows a review of the Authority's forward programme for both coal and nuclear stations.

The site is on the Bristol Channel coast of Somerset some four miles west of the mouth of the River Parrett. Construction of the station will be subject to the approval of the Somerset County Council and the local planning authority and to the consent of the Minister of Fuel and Power. Surveys indicate that limestone rock a few feet below the surface provides excellent foundation conditions for the support of the heavy load of the reactors and other plant. Further, the plentiful supplies of cooling water required for condensing purposes can readily be drawn from the sea.

The station at Inkley Point will be connected to the national grid, and could eventually supply the growing demands for electricity in the areas centred at Bridgwater and Taunton, which have hitherto depended upon supplies from more distant power stations.

According to *The Times*, an official of the Nature Conservancy stated last week that although the site adjoined the western end of the Bridgwater Bay nature reserve it was not expected that the wildfowl would be affected by the operations. The C.E.A. had consulted the Conservancy about the proposal from the time it was first suggested and while certain technical points remained to be cleared up they had no objection to the use of the site.

Somerset County Planning Committee is discussing the project this week and its recommendation will go before the County Council on 1st January.

Substation Dispute

A case just referred to the Eastern Electricity Consultative Council concerns a dispute between residents in Bewcastle Gardens and Corby Crescent, Enfield, and the Electricity Board over the erection of a transformer substation on a small site surrounded by houses in these two roads. The site was originally intended to take a house but the war intervened just after the foundations were laid and work was left incomplete. Now the E.E.B. has purchased a part of the site for the substation.

The plan is opposed on the grounds that the Board has failed to give any assurance that measures will be taken to prevent transformer hum. The Board claims that the site is the only one obtainable which is suitable. A considerable amount of building development has taken place in the locality and the substation is needed to maintain the voltage within the statutory limit. The residents, however, contend that the possible additional cost of cable involved in using another site would be negligible by comparison with the devaluation likely to be caused to their properties.

Power from Peat

Speaking to members of the Scottish Peat and Land Development Association recently, Mr. J. S. Pickles, chairman of the South of Scotland Electricity Board, said that there was a limit to the size of peat-fired generating stations because of the size of Scottish bogs. Some ten peat stations would be needed to produce the equivalent of the proposed nuclear station in Ayrshire (300 MW). Because of this limitation it would be difficult to use peat wholly for electricity generation. A small peat station would, for example, cost 20 per cent more per kilowatt than the coal station under construction at Kincardine and would be 20 per cent less efficient. The Board hoped that the new station at Barony for burning low-quality coal would also burn peat and it intended to experiment on a large scale with peat.

Gale Damages New Power Station

Three wall panels of the turbine house at the new power station in course of construction at Willington, Derbyshire, collapsed during a gale last week. One man received leg injuries and was taken to hospital.

Tax on Washing Machines

A memorandum to be placed before the East Midlands Electricity Consultative Council this week points out that industry has adopted labour-saving machinery on an extensive scale and urges that the housewife should also be given the opportunity of acquiring labour-saving appliances for the home at a reasonable price. It is considered that electric washing machines in particular should be freed from purchase tax.

Transport Undertaking's Finances

South Shields Town Council has set up a special sub-committee to consider the financial position of the transport undertaking in view of the latest wage increase for transport employees. During the past year the undertaking made a loss of about £800. The trolley-bus section earned a profit, but this was offset by a loss on the motor-buses.

TRADE MARKS

APPLICATIONS have been made for the registration of the following trade marks. Objections may be entered up to 14th December:—

No. 743,070 (design). Class 9. Radio valves.—Walmore Electronics, Ltd., Phœnix House, 19-23, Oxford Street, London, W.1.

IRRADIR. No. 754,630. Class 9. Electrical instruments and apparatus; and covered electric wire and electric cables.—Wandleside Cable Works, Ltd., 106, Garratt Lane, Wandsworth, London, S.W.18.

QUALITRODE. No. 755,435. Class 9. Electrodes for electric arc welding.—Welding Supplies, Ltd., Beechings Way, Gillingham, Kent.

PARAMOUNT. No. 756,183. Class 9. Electric vacuum cleaning apparatus.—Bylock Electric, Ltd., 109, South Street, Enfield, Middx.

STELLA. No. 753,044. Class 11. Infra-red heating apparatus (not being for medical or surgical use).—Stella Lamp Co., Ltd., 37-39, Oxford Street, London, W.1.

CALYPSO. No. 756,646. Class 11. Electrical heating apparatus.—Simplex Electric Co., Ltd., Broadwell, Oldbury, Birmingham.

Financial Section

STOCKS and SHARES

CONDITIONS in the Stock Exchange are changed from day to day by the nature of the political news, but events have at least given markets a chance to demonstrate their readiness to respond to encouragement. After another period of depression, the House began this week in a better frame of mind. Prices recovered some of the lost ground, although caution remained uppermost and prevented the development of anything approaching animation. In the field of home affairs, new issue activity continues to provide points of interest. The capital operation planned by Imperial Chemical Industries for the beginning of next year will be the biggest industrial issue ever made in this country. Company news from the electrical world has been mixed, with the accent on the effect of rising costs upon the margin of industrial profits.

I.C.I. Issue

The long-awaited capital issue by I.C.I. is to take the form of a 5½ per cent unsecured loan stock, redeemable 1977–79, bearing interesting rights of conversion into ordinary shares. An amount of £40 million stock is to be offered to stockholders of the company at a price of 96, giving a yield of nearly 5¾ per cent. Through the conversion rights, holders will be entitled to exchange into the company's £1 ordinary shares on terms equivalent to prices of 40s per share in 1958, 41s 9d in 1949 and 43s 8d in 1960. Their present price is about 38s 3d.

Brook Motors Prospects

Upon the appearance of the full annual report for 1955–56, Brook Motors 10s shares recovered to 30s ex-dividend. They had been marked down previously on the reduction in profits from £231,000 to £136,000 (after tax) disclosed in the preliminary statement of results issued a fortnight earlier. In his review, the chairman ascribes the setback to temporary factors, which included the fall in the price of copper and other materials, and a dislocation, unlikely to recur, in the supply of some components during the last part of the year. Having trebled its turnover in the American market, the company plans to double it this year. At home, it is said, the effects of the credit restrictions on demand seem to have passed the worst. Dividend for the year is unchanged at 25 per cent (the final 20 per cent being payable on increased capital) so that the return on the shares is now 8⅓ per cent.

Company News

Bakelite 10s shares were marked down to 22s 6d after the company's announcement that the maintenance of the current year's interim dividend at 5 per cent should not be taken to imply that the final will be up to last year's 11 per cent payment. Turnover is being substantially held, but the statement contains the increasingly familiar reference to contracting profit margins.

Price Changes in

Company or Board	Nom. Value	Middle price 3rd Dec.	Week's Rise or Fall	Dividend Previous	Dividend Last	Yield %	1956 Highest	1956 Lowest
Gilt-edged Stocks						£ s d		
Brit. Elec. 1968/73	100	72½		3	3	4 2 9	80½	72½
Brit. Elec. 1974/77	100	71½		3	3	4 4 0	79⅜	71½
Brit. Elec. 1976/79	100	75½		3½	3½	4 12 9	84	74½
Brit. Elec. 1974/79	100	85½	−1	4½	4½	4 19 6	95	85½
Overseas Electric Supply								
Calcutta Elec.	£1	19/-		6†	6†	6 6 3†	20/9	19/-
East African Power	£1	19/-	−6d	7	7	7 7 3	21/3	19/-
Nigerian Elec.	£1	17/6		10	10*	11 8 6	21/-	17/-
Perak Hydro-Elec.	£1	14/-	−6d	10	10*	14 5 6	17/6	14/6
Equipment and Manufacturing								
Aberdare Cables	5/-	9/9	−3d	17½	17½	9 9 3	13/6	9/9
Aerialite	1/-	4/9	−3d	45	48	10 2 0	6/9	4/9
Allen, W. H.	£1	35/-	−1/3	20	10*	5 14 3	39/-	33/6
Aron Elec. Ord.	£1	52/6		15	15	5 14 3	56/-	52/6
Assd. Automation	10/-	15/3	−6d	10	5	3 5 6	19/-	15/-
Assoc. Elec. Ord.	£1	61/3x.d.	+2/9	14	15	4 18 0	85/6	57/6
Automatic Tel. & El.	£1	50/-		15	15	6 0 0	72/6	50/-
Babcock & Wilcox	£1	68/9		15	15	4 7 3	85/6	64/-
Baldwin, H. J.	2/-	4/6		20	20	8 17 9	5/-	3/9
Bakelite	10/-	22/6	−3/-	16	16	7 2 3	34/-	22/6
Berry's Electric	5/-	6/-x.d.		—	10‡	8 6 9	6/6	5/9
British Aluminium	£1	61/9	+1/-	12	12	3 17 9	78/9	40/6
B.I. Callender's	£1	47/-	−1/-	10	12½	5 6 6	54/3	45/-
B.I. Callender's 6% Pref.	£1	21/3x.d.		6	6	5 13 0	22/6	20/3
British Tabulating	£1	40/9	−6d	9	9	4 8 3	51/3	37/3
British Thermostat	5/-	25/-		20	25	5 0 0	31/9	24/6
British Vac. Cleaner	5/-	7/6	−3d	30	15*	10 0 0	8/9	6/-
Brook Motors	10/-	30/-x.d.	+1/-	25	25	8 6 9	44/-	30/-
Brush Group	5/-	4/6		10	10	11 2 3	7/9	4/6
Bulgin, A. F.	1/-	4/-	−6d	45	50	—	5/3	4/-
Burco Dean	5/-	8/3	−6d	—	22½	13 12 9	13/6	8/3
Chloride El. Storage "A"	£1	55/-	−2/6	17½	17½	6 7 3	73/6	55/-
Clarke Chapman	£1	117/6		20	22½	3 16 6	123/-	89/6
Cole, E. K.	5/-	15/3		17½	17½	5 14 9	22/3	15/-
Cossor, A. C.	5/-	5/9		15	Nil	Nil	10/3	5/-
Crabtree	10/-	23/-	−6d	20	20	8 14 0	29/3	23/-
Crompton Parkinson Ord.	5/-	13/-		16	16	6 3 0	15/-	12/3
De La Rue	5/-	15/6x.d.	+3d	30	30	9 13 6	20/3	15/-
Decca "A"	4/-	23/9	−9d	56½	43¾*	7 7 3	44/9	23/3
Desoutter	5/-	29/-	−6d	25	30	5 3 6	32/9	25/9
Dewhurst	2/-	5/6x.d.		30	16½*	5 18 3	7/6	5/3
Dictograph Tel.	2/-	6/9		20	20	5 18 6	7/3	5/6
Dubilier Condenser	1/-	4/9	−3d	25	30	6 6 3	5/3	3/6
Duport	5/-	17/6		23	25	7 2 9	21/6	13/9
E.M.I.	10/-	22/9	−3d	15	15	6 11 9	37/-	22/6
Electrical Components	5/-	7/-		25	25	8 18 6*	8/-	6/3
Elec. Construction	£1	22/6		8½	8½	7 11 0	29/9	22/6
Elliott Bros.	5/-	22/6		17½	20‡	4 9 0	36/9	22/6
Enfield Cable Ord.	£1	13/-		Nil	Nil	Nil	19/3	13/-
English Electric	£1	45/-		12½	12½	5 11 0	66/3	43/9
English Electric 3½% Pref.	£1	13/-		3½	3½	5 15 6	14/6	12/6
Ericsson Tel.	5/-	32/-	+6d	20†	20†	3 2 6†	42/9	31/-
Ever Ready	5/-	27/9	−3d	35	35	6 6 3	32/9	24/-
Falk Stadelmann	£1	35/6	−9d	17½	17½	9 17 3	45/9	35/6
G.E.C. Ord.	£1	42/6	+1/3	12½	14	6 11 9	65/6	41/3
G.E.C. 6½% Pref.	£1	22/-		6½	6½	5 18 3	23/9	21/3
General Cables	5/-	11/3		30	30	13 6 9	13/9	11/3
Greenwood & Batley	£1	46/3		17½	17½	7 11 3	47/6	45/-
Hackbridge Holdings	5/-	18/9	−1/-	25	30	8 0 0	24/6	18/9
Hackbridge & Hewittic	5/-	13/9x.d.		30	23*	8 7 9	22/-	13/9
Heatrae	2/-	4/-		15	15	7 10 0	5/1	3/9
Henley's	10/-	14/3	−6d	10½	11½	8 1 6	19/9	14/-
Holophane	5/-	17/6		30	30	8 11 6	21/6	17/-

The above quotations are based upon middle prices in the Stock Exchange Daily Official List.
* After scrip issue. † Free of income tax. ‡ Dividend indicated.

At the Aerialite annual meeting the chairman reviewed a year which produced increases in sales, profits and the dividend. In the first months of the present year the company was continuing to enjoy good business, steps having been taken to offset successfully the difficulties of the credit squeeze. At 4s 9d the 1s shares yield about 10 per cent on the dividend of 48 per cent, which comes from earnings equivalent to 118 per cent on the issued capital of £200,000. Turner & Newall £1 ordinary reacted well to the unexpected increase in the dividend from 25 to 27½ per cent and to the good results. After rising from 93s to £5, they now show a return of 5½ per cent.

Electrical Investments

Company or Board	Nom. Value	Middle price 3rd Dec.	Week's Rise or Fall	Dividend Previous	Dividend Last	Yield% £ s d	1956 Highest	1956 Lowest
Equipment and Manufacturing—continued								
Hoover	5/-	23/6		70	50	10 12 9	39/3	23/-
I.C.I.	£1	38/3	+9d	10	10	5 4 6	49/9	37/3
Intl. Combustion	5/-	18/9		25	20*	5 6 9	25/-	15/3
Johnson & Phillips	£1	27/6	−6d	15	15	10 18 3	46/6	27/6
Lancashire Dynamo	£1	37/6		15	11*	5 17 0	49/9	37/6
Laurence, Scott	5/-	14/9		12½	15	5 1 9	16/9	13/3
Lister, R. A.	£1	24/6	−6d	9·3	10	8 3 3	35/3	24/6
London Elec. Wire	£1	42/6	−6d	12½	12½	5 17 9	52/9	42/6
Lucas, J.	£1	28/9		7½	7½	5 4 3	40/3	28/9
Marryat & Scott	2/-	8/9		30	30	6 17 3	11/3	8/9
Mather & Platt	£1	50/-	−1/-	15	15	6 0 0	65/3	50/-
Metal Industries	£1	22/-	−6d	9	9	—	27/-	16/3
Midland Elec. Mfg.	£1	45/-		10	12½	5 11 0	48/6	43/6
Morphy-Richards	4/-	10/6		50	50	—	13/9	10/-
Murex	£1	62/-		20	20	6 9 0	74/6	60/-
Newman Ind.	2/-	2/3		10	10	8 17 9	2/9	2/1
Oldham & Son	1/-	2/6x.d.		20	17½*	7 0 0	3/-	2/3
Parnall (Yate)	5/-	6/-		14	12	10 0 0	9/6	5/6
Parsons, C. A.	£1	88/9	+2/6	10	10	2 5 0	96/-	61/6
Plessey	10/-	59/3x.d.		27½	30	5 1 3	87/6	56/-
Pye "A" Deferred	5/-	13/9		12½	12½	4 11 0	21/3	13/3
Reyrolle	£1	95/-	+2/6	15	16½	3 8 6	117/6	81/-
Rheostatic	4/-	9/-		18½	12‡	5 6 9	—	8/3
Richardsons Westgarth	5/-	14/6	−6d	16⅝	16⅝	5 15 0	17/-	13/9
Scottish Cables	4/-	14/9		27½	27½	7 9 3	17/9	14/9
Smith (England), S.	4/-	11/-x.d.	+3d	17½	17½	6 7 3	14/3	10/6
Southern Areas	£1	13/9		10	7½	10 18 3	28/9	13/9
Strand Elec.	5/-	7/3	−6d	15	15	10 6 9	8/6	6/9
Sturtevant	5/-	21/3	−1/3	14·4†	15†	3 10 6†	31/3	21/3
Sun Elec.	£1	42/6x.d.		20	25	11 15 3	42/6	33/9
Switchgear & Cowans	5/-	12/9		20	25	9 16 0	17/-	12/9
Taylor Tunnicliff	5/-	11/3		15	15	6 13 3	14/-	11/3
T.C.C.	10/-	33/9	−2/6	25	25	7 8 3	45/-	33/9
T.C. & M.	£1	24/-	−6d	8½	8½	7 1 9	34/-	24/-
Telephone Mfg.	5/-	6/-		10	10*	8 6 9	8/6	6/-
Thorn Elec.	5/-	15/-	−9d	15	15	5 0 0	22/6	15/-
Thornycroft	£1	33/6	−1/-	15	12½	7 9 3	49/9	33/6
Tube Investments	£1	52/6	+1/3	22½	15*‡	5 14 3	70/6	50/9
Vactric	5/-	11/6		15	17½*	7 12 3	15/-	11/-
Veritys	5/-	8/6		12½	12½	7 7 0	10/-	6/9
Walsall Conduits	4/-	11/3	−3d	70	20*	7 2 3	13/6	10/9
Ward & Goldstone	5/-	35/9x.d.		30	35	4 18 0	39/6	29/-
Watford	2/-	5/9		25	25	8 13 9	7/6	5/6
Westinghouse	£1	67/6		18	18	5 6 9	100/-	67/6
West, Allen	5/-	11/3	−3d	15	15	6 13 3	14/6	11/3
Wolf Electric	5/-	17/6		20	20	5 14 3	26/3	17/6
Trusts, Transport and Communications								
Anglo-Portuguese	£1	21/3		8	8	7 10 6	23/6	20/3
Brit. Elec. Traction: Def. Ord. "A"	5/-	16/-		22½	22½	7 0 9	20/-	15/6
Cable & Wireless: Ord.	5/-	9/3	−3d	10	10	5 8 0	11/3	9/3
4% Loan	100	91		4	4	4 8 0	92½	88
Calcutta Trams	£1	25/-		7½†	8½†	6 15 0†	27/6	23/-
Cape Elec. Trams	£1	16/3		8	8	9 17 0	20/3	16/3
Marconi Marine	£1	31/-		10	10	6 9 0	34/-	31/-
Oriental Tel. Ord.	1/-	66/3	−1/3	16	—	—	90/-	66/3
Telephone Rentals	5/-	9/6		12½	12½	6 11 6	11/9	9/6

Motor Accessories

Reports issued towards the end of last month by Joseph Lucas (Industries) and S. Smith & Son (England) shed light on conditions affecting the production of motor-car accessories. In the experience of both companies, demands from the motor industry began to fall soon after the turn of this year, and with deterioration persisting there were trading losses in these sections of the business during the second half of the financial years ended in July. So far as total profits were concerned, however, the annual results in each case came out above market expectations. Lucas earnings contracted from the equivalent of 37 to 25 per cent on the ordinary capital, and those of S. Smith from 78 to 76 per cent, still leaving excellent cover for the dividends of 7½ and 17½ per cent respectively. It is evident in both reports that a policy of widening the range of products did good service as a protection against the difficulties in the motor-car industry.

Peto Scott Meeting

The 1s ordinary shares of Peto Scott Electrical Investments, whose annual meeting was held last week, are quoted at about 2s to yield 8½ per cent on the dividend of 16⅔ per cent paid for the last two years. This is a notably well covered payment, the earnings for the year ended last June being equivalent to more than 100 per cent on the issued capital of £60,000. The chairman reported that in this period the company's turnover established a record in passing the million mark. Restrictions on hire-purchase and increased purchase tax had not prevented the factories from remaining fully employed, or the whole production of television sets from being sold. Demand had been stimulated by reductions in prices, and was continuing into the present year.

William Sugg & Co.

In connection with a reduction in the earnings of William Sugg & Co. during the year ended in June, the chairman referred at the recent annual meeting to a considerable contraction of armaments work, and to the effects of a fall in raw material prices, particularly in the case of brass. As a consequence, the total dividend for the period is being lowered to 15 per cent, as compared with the rate of 20 per cent to which it was raised a year ago. The policy of the company has been to widen the range of its activities. The chairman hopes to see continued progress in the sale of heating appliances, despite the credit squeeze. The price of the 5s shares, in which business is not often recorded, is around 9s 6d, and the yield is 7·9 per cent.

REPORTS and DIVIDENDS

A.E.I. and Siemens.—Associated Electrical Industries, Ltd., announces that an offer will be made to the holders of 4 per cent cumulative redeemable second preference stock in Siemens Brothers & Co., Ltd., due to be redeemed on 1st January next, at the rate of 22s per £1 stock. A.E.I. will issue to accepting stockholders, credited as fully paid, 94 A.E.I. 4½ per cent "B" cumulative preference shares and 16 A.E.I. ordinary shares, all of £1 each, for every £100 Siemens Brothers second preference stock surrendered. The offer closes on 28th December.

Peto Scott Electrical Instruments, Ltd.—Mr. C. F. Hollamby (chairman) presided at the annual meeting held on 29th November. In his circulated statement he said that during the year under review the turnover for the first time exceeded £1,000,000. Throughout the year they had been able to sell the whole of their production of television sets and the factory had been kept fully employed. Economies had enabled them to reduce the prices of the television sets. On the electronic side of the business they had continued to carry out contracts both for the Government and for the aircraft industry.

Aerialite, Ltd.—The annual meeting was held on 29th November. In his circulated statement Mr. L. S. Hargreaves (chairman and managing director) said that during the year under review they had further increased their turnover and profit. They had had a good demand for all their products and in the busy season had had difficulty in supplying sufficient to meet the demand. The tendency in the current year was the same as that of the past year. Their associate, Nettle Accessories, Ltd., had increased its profit and extended its factory space at Wythenshawe. Aycliffe Cables, Ltd., of Johannesburg, was still busy and although they were not happy with the profit level they could obtain in Johannesburg, the business was increasing its turnover and consolidating itself in the South African market.

Heenan Group, Ltd.—In his circulated statement covering the group's activities during the year ended 1st September last, Mr. C. L. Hill (chairman) says that at the close of the year the group's order books stood at £5,450,000. Rising costs of production and credit restrictions are having their effect on profit margins; buyers in resisting price increases and it is overseas markets and at home are frequently the case of a sale at a low profit or no sale at all. Reviewing the activities of the subsidiaries, Mr. Hill says that the engine test plant section of Heenan & Froude, Ltd., has made further progress in its development programme and, in particular, the prototype of a new dynamometer has been built which will eventually replace the existing range of the smaller hydraulic dynamometers. Sales of eddy current couplings have again substantially increased. In the industrial section, sales of Heenan-Marley cooling towers, introduced last year, have been satisfactory and the range is now being extended to the larger sizes. The special hydraulic plant ordered by the United States from Fielding & Platt, Ltd., mentioned last year, has now been dispatched as has cable sheathing equipment for Canada. During the year extrusion presses were delivered to customers in this country and others are in course of manufacture.

The Kenya Power Co., Ltd.—In his circulated statement issued with the accounts for the past year, Sir Philip E. Mitchell (chairman) says that the company received its bulk supply licence during the year, which enabled it to enter into agreements for taking over the Tana and Wanjii hydro-electric stations of the East African Power & Lighting Co., Ltd., together with the ancillary transmission lines to Nairobi. These stations have an installed capacity of 2·18 MW. Supply to Nairobi from these stations commenced in June, 1955, since when 82·5 million kWh has been generated and transmitted to Nairobi. A contract was placed with Balfour, Beatty & Co., Ltd., for the construction of the main transmission line to operate at 132,000 V. This line commences at Nairobi and extends for some 250 miles to Tororo where the supply is taken from Uganda; the line should be in operation by the end of 1957.

Lancashire Dynamo Holdings, Ltd., has now acquired the business of J. G. Statter & Co., Ltd., the electrical switchgear manufacturers, of Amersham Common, Bucks. For this purpose the capital of Lancashire Dynamo Holdings has been increased to £3,000,000 by the creation of 500,000 ordinary shares of £1 each.

Bakelite, Ltd.—In announcing an unchanged interim dividend of 5 per cent, the directors state that while turnover is being substantially maintained in the current year, profit margins have been adversely affected by the general trend of business, and it should not be inferred that the final dividend will be maintained at the same 11 per cent level as paid for 1955.

Metal Industries, Ltd.—An extraordinary meeting has been requisitioned by the honorary presidents, Sir J. Donald Pollock, Mr. S. J. L. Hardie and Mr. R. W. McCrone, and 20 other stockholders to be held on 20th December to consider the election of Mr. S. J. L. Hardie, Mr. R. W. McCrone and Mr. R. K. Fleming to the board. Sir Charles Westlake (chairman) has circularised shareholders proposing that Mr. S. J. L. Hardie should resign the office of honorary president and that Mr. E. B. Ball be removed from his office as a director. Sir Charles maintains that the election of the three nominees for directorships would not be in the company's best interests. Another point at issue is the degree of autonomy to be given to the boards of the subsidiaries. The chairman maintains that it is the board of the holding company which is responsible to shareholders and that the board should be adequately represented on the subsidiaries' boards.

Associated British Engineering, Ltd., has declared an interim dividend of 4 per cent (unchanged). In making the announcement, the directors state that the group's turnover has been well maintained, but increased costs in materials and wages have had to be absorbed which are reflected in a lower margin of profit on some of the group's products. The volume of new orders received has been satisfactory and the order book shows a healthy position.

Dewhurst & Partner, Ltd.—The accounts for the year to 30th September last show a profit after all charges, including £128,898 for taxation, of £123,759, as compared with £104,984 for the preceding year. It is proposed to pay a final dividend of 12½ per cent, making 16¼ per cent for the year on increased capital. The total dividend for the previous year on smaller capital was 30 per cent.

Worthington-Simpson, Ltd., is maintaining its interim dividend at 10 per cent.

The Harland Engineering Co., Ltd., is paying an interim dividend of 4 per cent (unchanged) on increased capital.

Bankruptcies

W. A. C. Peacock, trading as W. A. C. Peacock & Son, at 49, Burkitt Street, King's Lynn, Norfolk, electrician.—Trustee, Mr. R. Tunnard, 8, The Crescent, Wisbech, Cambs, appointed 20th November.

D. L. Stoneham, electrical contractor, lately carrying on business at 3, Crombey Street, Swindon, Wilts. Trustee, Mr. G. W. Sisman, 26, Baldwin Street, Bristol, 1, Official Receiver, released 20th November.

Liquidations

Internal Telephone Services, Ltd.—Meeting of members, pursuant to section 290 of the Companies' Act, 1948, on 19th December at the offices of Chalmers, Wade & Co., 24, Coleman Street, London, E.C.2, to receive an account of the winding up by the liquidator, Mr. J. N. Thurgood.

Pioneer Private Telephone Co., Ltd.—Meeting of members, pursuant to section 290 of the Companies' Act, 1948, on 19th December at 24, Coleman Street, London, E.C.2, to receive an account of the winding up by the liquidator, Mr. J. N. Thurgood.

Reed Radio, Ltd.—Winding up. Liquidator, Mr. A. W. Hunter, 418-422, Strand, London, W.C.2, appointed 14th November.

The Cawnpore Electric Supply Corporation, Ltd.—Members' voluntary winding up. Meeting of members on 3rd January at Orient House, New Broad Street, London, E.C.2, to receive an account of the winding up by the liquidator, Mr. A. L. E. Tucker.

NEW ELECTRICAL EQUIPMENT

Industrial Valves

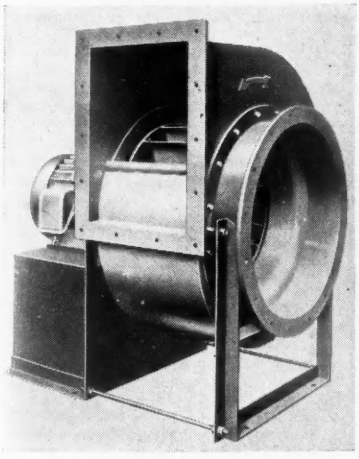
Three new triode valves, intended primarily for use in industrial heating equipment, have been developed by the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2. With thoriated tungsten filaments and anode dissipations of 5, 10 and 20 kW, the forced air-cooled types are the ACT.100, ACT.101 and ACT.102 respectively. Water-cooled versions of the 10 and 20 kW types are also available. The rugged constructional techniques and the generous ratings are the result of the endeavour to produce designs capable of long and trouble-free operation under onerous industrial conditions.

P.V.C. Fans

In association with Matthews & Yates, Ltd., Swinton, Manchester, TURNER & BROWN, LTD., Davenport Works, Bolton, have redesigned and extended their range of p.v.c. fans to give a much wider choice of sizes and duties.

These "Turbro-Cyclone" fans are fabricated throughout from rigid p.v.c. sheet, which is tough and light, dimensionally stable and non-inflammable. It also possesses inherent corrosion-free characteristics against both weathering and chemical attack. The construction makes them suitable for all kinds of fume removal installations which handle chemical and corrosive fumes, moist gases, etc., at temperatures not exceeding 140 deg F.

"Turbro-Cyclone" p.v.c. fan



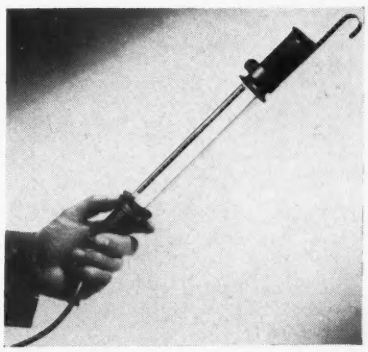
The smallest fans have been designed for fume cupboards, cabinets and small laboratories where the need is for a compact, efficient and chemically impervious unit with direct coupled motor. The other fans have larger outputs, and are available either direct coupled or with vee-rope drives. In all cases a totally enclosed single- or three-phase motor is provided.

A steel plate base is bolted, by means of an outside metal frame, to the p.v.c. casing in such a way that any one of eight angles of discharge can be arranged with either rotation. The multivane impeller incorporates a mild steel hub which has a p.v.c. covering extending over the shaft and to the outside of the casing to ensure protection against chemical elements.

Olive green "Cobex" rigid vinyl sheet made by BX Plastics, Ltd., has been standardised throughout and a matching stove-enamelled finish for all motors, support frames and bases gives the fans an attractive appearance.

Fluorescent Inspection Lamp

The new "Lexlite" fluorescent inspection lamp manufactured by LEXINGTON PRODUCTS, LTD., 3-6, Alfred Place, Tottenham Court Road, London, W.C.1, is of sturdy construction, and is claimed to be virtually unbreakable.



Lexington Products "Lexlite" fluorescent inspection lamp

The handle is of rubber and a spring clip is provided for hanging purposes. The estimated life of the 12in 6 W fluorescent tube is 2,000 hours. One side of the tube is mirror-finished and this increases luminosity and protects the user's eyes.

The overall dimensions of the lamp are 13in by 1¼in and it weighs only 9 oz. It is supplied with 4 yd of heat resisting cable and the price is £2 9s 6d.

Potato Peeler

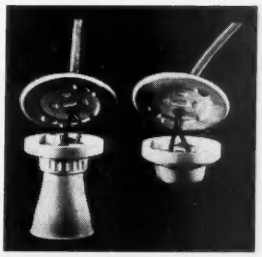
The new model C.56 "Admiralty" potato peeling machine now being marketed by CRYPTO, LTD., North Circular Road, London, N.W.10, is ruggedly constructed to meet the requirements of the larger catering establishments and can deal with ½ cwt of potatoes at a time.

A mixture of carborundum and Bakelite cement is baked on to the walls of the peeling chamber and peeling plate to give a waterproof abrasive surface and quick peeling with a minimum of waste. The peeling plate is easily removed, lifting hooks being provided. It is powered by a 1 h.p. motor and has automatic gear box lubrication from an oil sump. The 25 A on/off switch is protected by a swinging cover. The machine measures 25¼in in diameter and 47½in high and the total weight is 640 lb. The finish is in mottled grey cellulose.

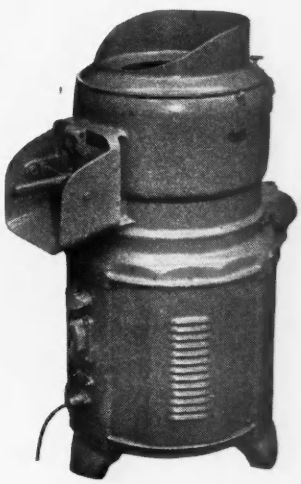
Ceiling Rose Backplate

The latest addition to the range of electrical wiring accessories manufactured by NETTLE ACCESSORIES, LTD., Harper Road, Wythenshawe, Manchester, 22, is a flanged backplate, with 2in centre fixing holes, to accommodate the standard ceiling rose or batten holder. It has five knockouts, four sizes for accommodating 2-core cable, and a centre knockout for 3-core cable. It complies with the I.E.E. Regulations for the Electrical Equipment of Buildings, Clause 207G. The price per dozen is 6s (brown) and 7s (white).

Nettle backplate in position on a batten holder and ceiling rose



Crypto model C.56 "Admiralty" potato peeler



NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (3s 0d each including postage) will be obtainable after 12th December from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1951

1626. United Kingdom Atomic Energy Authority.—Nuclear reactor power plants. 22nd January, 1952. (763231.)

3711. Morle, C. W. (Brennan, J. B.).—Electric condensers and methods of manufacture therefor. 15th February, 1951. (763188.)

9570. Brush Electrical Engineering Co., Ltd.—Electrical control arrangement for an a.c. supply. 23rd July, 1952. (763431.)

10204. Brennan, J. B.—Electrolytic devices. 1st May, 1951. (763189.)

1952

3964. Hotpoint Electric Appliance Co., Ltd.—Alarm circuits particularly for low temperature storage cabinets. 12th February, 1953. (763332.)

21490. Mullard Radio Valve Co., Ltd.—Permanent magnet focusing arrangements for cathode-ray tube. 31st July, 1953. (763586.)

26389. Osnabruecker Kupfer- und Drahtwerk.—Metal sheathed electric cables. 21st October, 1952. (763588.)

31599. British Relay Wireless, Ltd., Russell, K. A., and MacDonald, D. A.—Wired television broadcasting systems. 9th December, 1953. (Cognate application 15372, 3rd June, 1953.) (763193.)

1953

4885. Electric & Musical Industries, Ltd.—Radar automatic tracking circuits. 22nd February, 1954. (763575.)

4887. Electric & Musical Industries, Ltd.—Automatic tracking circuits for radar and pulse generating circuits suitable for use therein. 22nd February, 1954. (763576.)

10014. General Electric Co.—Signal voltage amplitude limiters and phase discriminators. 13th April, 1953. (763237.)

15328. British Relay Wireless, Ltd., Russell, K. A., and MacDonald, D. A.—Relaying of television pictures over wires. 25th May, 1954. (763194.)

15833. Johnson, A. E., and Conway, T. D.—Electrical reproducing apparatus. 9th September, 1954. (763341.)

17221. Philips Electrical Industries, Ltd.—Transistor circuits for amplifying electrical signals. 22nd June, 1953. (763443.)

19646. Beedell, G. M.—Electric door control apparatus. 15th July, 1954. (763342.)

21673. Electric & Musical Industries, Ltd.—Manufacture of cathode-ray tubes. 30th July, 1954. (763243.)

22315. Brookhirst Switchgear, Ltd., and Butterworth, E. M.—Electric switches or switchgear. 6th August, 1954. (763245.)

27595. VEB Grubenlampenwerke.—Processes for activating the electrodes of alkaline electric accumulators. 7th October, 1953. (763452.)

27826. English Electric Co., Ltd.—Refrigerator cabinets. 8th October, 1954. (763454.) 28615. Refrigerators. 15th October. 1954. (763248.)

28985. Sterdy Telephones, Ltd.—Electrically remote controlled locks. 20th January, 1955. (763609.)

30510. Standard Telephones & Cables, Ltd.—Electro-mechanical recording systems. 29th October, 1954. (763249.)

31171. Siemens-Schuckertwerke Akt.-Ges.—Electric semi-conductor instruments. 10th November, 1953. (763348.)

31544. Soc. d'Eléctronique et d'Automatisme.—Servo devices. 13th November, 1953. (763252.)

31555. British Thomson-Houston Co., Ltd.—Multi-contact electric switch. 15th November, 1954. (763548.)

31589. Reyrolle & Co., Ltd., A.—Voltage transformer units for high voltage switchgear. 8th November, 1954. (763349.)

33289. Chromatic Television Laboratories, Inc.—System of colour television transmission. 1st December, 1953. (763352.)

33633. Montecatini Soc. Generale per l'Industria Mineraria e Chimica.—Electric reactors for catalytic gas reactions at high temperatures, and process for the endothermic production from methane and ammonia, of both hydrocyanic acid and hydrogen. 3rd December, 1953. (763461.)

35606. Siemens-Schuckertwerke Akt.-Ges.—Dry rectifier arrangements. 22nd December, 1953. (763354.)

1954

807. Sperry Rand Corporation.—Pulse radar systems. 11th January, 1954. (763195.)

2566. National Research Development Corporation.—Control of induction motors. 25th January, 1955. (763362.)

3825. Teddington Aircraft Controls, Ltd.—Electric actuators. 9th February, 1955. (763475.)

4945. English Electric Co., Ltd.—Inductive windings. 18th February, 1955. (763479.)

7326. General Electric Co., Ltd., and Peddle, E. A. R.—Electronic valve circuits. 14th March, 1955. (763270.)

8601. Reyrolle & Co., Ltd., A.—Time-lag devices for electric relays. 21st March, 1955. (763487.)

8693. Cole, Ltd., E. K., and King, A. E.—Electrical inductance coils. 25th March, 1955. (763488.)

9953. Steatit-Magnesia Akt.-Ges.—Magnetic ferrites. 5th April, 1954. (763494.)

10216. General Electric Co., Ltd., and Easter, B.—Electric attenuators. 6th April, 1955. (763641.)

11517. Marconi's Wireless Telegraph Co., Ltd.—Variable inductance devices. 18th February, 1955. (763497.)

12193. Metropolitan-Vickers-Grs., Ltd.—Track circuits for railways. 6th April, 1955. (763500.)

12930. Creed & Co., Ltd.—Circuits for providing a variable bias potential. 4th May, 1954. (763279.)

13455. Minneapolis-Honeywell Regulator Co.—A.c. frequency measuring apparatus. 7th May, 1954. (763503.)

15699. Short Bros. & Harland, Ltd.—Electro-mechanical transducers. 25th May, 1955. (763226.)

16844. Reyrolle & Co., Ltd., A.—Arc-chutes for air-break circuit-breakers. 7th September, 1955. (763510.)

18178. Compagnie Générale de Télégraphie sans Fil.—Radio direction finding systems. 21st June, 1954. (763511.)

20471. Osnabrücker Kupfer- und Drahtwerk.—Tool and apparatus for the production of corrugated sheaths for electric cables. 21st October, 1952. 20472. Method of drying and impregnating electric cables. 21st October, 1952. (Divided out of 763588.) (763590.)

22418. Crabtree & Co., Ltd., J. A., and Coleman, E.—Electric switches or circuit-breakers. 14th July, 1955. (763227.) 22419. Electric circuit-breakers. 14th July, 1955. (763228.)

22693. Kabushikikaisha Nihondenshi Kogaku Kenkyusho.—Electron microscope. 4th August, 1954. (763522.)

23461. British Thomson-Houston Co., Ltd.—Linear motion device. 27th July, 1955. (763524.)

25736. Siemag Feinmechanische Werke Ges.—Electrical or partly electrical typewriters or like machines. 6th September, 1954. (763400.)

25913. Telephone Manufacturing Co., Ltd.—Electric coils. 7th September, 1955. (763401.)

27701. Watliff Co., Ltd.—Commutators for electric motors and generators. 25th October, 1955. (763404.)

27711. Hedström, B. E.—Electric batteries. 24th September, 1954. (763540.)

28150. Siemens-Schuckertwerke Akt.-Ges.—Apparatus for the continuous treatment in vacuo of wire or other strip-like material. 29th September, 1954. (763541.)

28326. Westinghouse Electric International Co.—Manufacture of electric incandescent lamps. 1st October, 1954. (763310.)

28784. Opti-Werk Ges.—Screening means for high-frequency apparatus. 6th October, 1954. (763600.)

30211. Western Electric Co., Inc.—Travelling wave tubes and the manufacture thereof. 20th October, 1954. (763545.)

30675. Landis & Gyr Akt.-Ges.—High precision time switch. 25th October, 1954. (763546.)

31012. Philips Electrical Industries, Ltd.—Transistor circuits for stabilising voltage. 27th October, 1954. (763316.)

32156. Philips Electrical Industries, Ltd.—Circuit arrangements for automatically regulating the temperature of electric ovens. 5th November, 1954. (763551.)

32739. Radio Corporation of America.—Magnetic sound transduction. 11th November, 1954. (762928.)

33431. Western Electric Co., Inc.—Electrical pulse switching circuits. 18th November, 1954. (762930.)

34195. Philips Electrical Industries, Ltd.—Circuit arrangement for frequency transformation of oscillations of very high frequency. 25th November, 1954. (762743.)

34972. General Electric Co.—Combustion chambers for fluid fuels. 2nd December, 1954. (762834.)

35254. Philips Electrical Industries, Ltd.—Frequency changer circuit arrangements for use at very high frequencies. 6th December, 1954. (762745.)

35633. Standard Telephones & Cables, Ltd.—Railway signalling apparatus. 9th December, 1954. (762748.)

35707. Sangamo Weston, Ltd.—Methods of making electrical connections, particularly in the manufacture of resistors. 9th December, 1954. (762838.)

35810. Western Electric Co., Inc.—Frequency conversion circuits. 10th December, 1954. (762935.)

35842. Automatic Electric Laboratories, Inc.—Auto-selecting cross-bar telephone system. 10th December, 1954. (762840.)

35861. Siemens-Schuckertwerke Akt.-Ges.—Magnetic clutches. 10th December, 1954. (762935.)

35966. Baker Perkins, Ltd.—Means for controlling the switching positions of multi-way switches. 19th May, 1953. (Divided out of 763169.) (763170.)

35980. Hartig, F.—High-tension switches. 13th December, 1954. (763567.)

36737. Vickers-Armstrong (Aircraft), Ltd.—Ducts for electrical conductors. 26th October, 1955. (762843.)

1955

244. General Electric Co.—Rotor members for dynamo-electric machines. 4th January, 1955. (763682.)

256. Hoover, Ltd.—Floor polishers. 4th January, 1955. (763683.)

386. Simon-Carves, Ltd.—Multi-cell cyclone dust separators. 6th January, 1955. (763685.)

747. Maschinenfabrik Oerlikon.—Magnetic device for detecting reverse current. 10th January, 1955. (763695.)

1096. Chromatic Television Laboratories, Inc.—Grid structures for use in cathode-ray tubes. 13th January, 1955. (763430.)

1242. General Electric Co.—Reversible electric motor control means. 14th January, 1955. (763708.)

NEXT WEEK'S EVENTS

Organisers of electrical functions are advised to make use of the "Electrical Review" clearing house, Room 221, Dorset House, Stamford Street, London, S.E.1, to ascertain that proposed dates do not clash with others already arranged.

Monday, 10th December

BRISTOL. — Lecture Hall, Engineering Laboratories, University Walk, 6 p.m. I.E.E. Western Centre. "The Potentialities of Railway Electrification at the Standard Frequency," by E. L. E. Wheatcroft and H. H. C. Barton.

CHESTER.—Town Hall, 6.30 p.m. I.E.E. Mersey & North Wales Centre. "The Control of Nuclear Reactors," by R. J. Cox and J. Walker.

LEEDS.—24, Aire Street, 6.15 p.m. I.E.S. Leeds Centre. "The Electrical Installation of the New Leeds College of Technology," by J. H. Gura.

LONDON.—Savoy Place, W.C.2, 5.30 p.m. Institution of Electrical Engineers, informal meeting. Discussion on "Unsolved Problems Arising from Automation," opened by G. L. E. Metz.

Holophane House, Elverton Street, Vincent Square, S.W.1, 7.30 p.m. A.S.E.E. Central London Branch. "Flameproof Lighting Equipment," by J. G. Holmes.

17, Victoria Street, S.W.1, 5.30 p.m. Society of Engineers. Annual general meeting.

MANCHESTER. — Engineers' Club, Albert Square, 7.30 p.m. Junior Institution of Engineers, North-Western Section. "Diesel Electric Traction," by E. T. Bostock.

NEWCASTLE-UPON-TYNE. — Neville Hall, 6.15 p.m. I.E.E. North-Eastern Centre. "Conduction and Induction Pumps for Liquid Metals," by Dr. L. R. Blake.

Royal Station Hotel, 7 p.m. Institution of Works Managers, Tyne-Wear Branch. "Some Aspects of Atomic Energy in Industry," by P. R. Hills.

NORWICH.—Assembly House, 7.30 p.m. I.E.E. East Anglian Sub-Centre. "Some Impressions of Electrical Progress in the U.S.S.R.," by C. T. Melling.

NOTTINGHAM.—Daybrook House, Ribbledale Road, 7.30 p.m. Institution of Works Manager, Notts & Derby Branch. Ladies' evening.

PORTSMOUTH.—C.E.A. Conference Room, High Street, 6.20 p.m. I.E.E. Southern Graduate & Student Section. "Television Outside Broadcasting Units," by F. H. Steele and K. T. D. Hughes.

REDDITCH.—I.E.E. South Midland Centre, Malvern & District meeting. Informal evening on "Ultrasonics in Industry," talk by C. F. Brocklesby.

SHEFFIELD.—The University, Western Bank, 6.30 p.m. I.E.S. Sheffield Centre. Presidential address, by W. E. Harper.

Livesey Clegg House, 7.30 p.m. Junior Institution of Engineers, Sheffield & District Section. "Introduction to Armature Winding," by R. A. Reeve.

Tuesday, 11th December

ARBORFIELD.—R.E.M.E. Training Centre, Bailleul Barracks, 7 p.m. I.E.E. London Graduate & Student Section, district meeting. Film evening.

BELFAST.—Queen's University, 6.30 p.m. I.E.E. Northern Ireland Centre. "The Crystal Palace Television Transmitting Station," by F. C. McLean, A. N. Thomas and R. A. Rowden.

BOURNEMOUTH.—Grand Hotel, Firvale Road, 8 p.m. A.S.E.E. Bournemouth Branch. Members' lecturettes, by E. Joyce and E. Frost.

BRADFORD.—Y.E.B., Sunbridge Road, 7 p.m. I.E.E. North Midland Graduate & Student Section. "The Automatic Factory," by C. F. Stewart.

EDINBURGH.—11, Atholl Crescent, 7.30 p.m. Edinburgh Electrical Society. "Plastic Cables," by E. F. Duncan.

HATFIELD. — Technical College, 7 p.m. I.E.E. district meeting. "A Transatlantic Telephone Cable," by Dr. M. J. Kelly, Sir Gordon Radley, G. W. Gilman and R. J. Halsey.

LONDON.—At the Institution of Electrical Engineers, Savoy Place, W.C.2, 5 p.m. Institution of Post Office Electrical Engineers, London Centre. "The Independent T.V. Network—Its Operation and Maintenance," by C. E. Clinch and J. B. Sewter.

Connaught Rooms, W.C.2, 12.30 for 1 p.m. Electrical Industries Club. Luncheon: speaker, Mr. Morley Parry.

MANCHESTER. — The University, Dover Street, 6.15 p.m. I.E.E. North-Western Utilisation Group. "A Self-Oscillating Induction Motor for Shuttle Propulsion," by E. R. Laithwaite and P. J. Lawrenson.

College of Technology, 7.30 p.m. Society of Instrument Technology, Manchester Section. "Control of the Radio Telescope," by Dr. J. G. Davies.

RUGBY.—College of Technology & Arts, 6.30 p.m. I.E.E. Rugby Sub-Centre. "The Application of Digital Computers," by Dr. R. L. Grimsdale.

STAFFORD. — Technical College, 7 p.m. I.E.E. North Staffordshire Sub-Centre. "Factors Influencing the Design of Modern Rolling Mill Drives," by H. S. Brown.

Wednesday, 12th December

ABERDEEN.—Caledonian Hotel, 7.30 p.m. I.E.E. North Scotland Sub-Centre. "TRIDAC—A Large Analogue Computing Machine," by Lt.-Cdr. F. R. J. Spearman, J. J. Gait, A. V. Hemingway and R. W. Hynes.

BIRMINGHAM.—At the Birmingham & Midland Institute, Paradise Street, 6.30 p.m. I.E.E. South Midland Centre. "The Kemano-Kitimat Development," by F. L. Lawton.

Exchange & Engineering Centre, Stephenson Place, 7.15 p.m. A.S.E.E. Birmingham Branch. Film show.

BLACKBURN. — N.W.E.B. Demonstration Theatre, Darwen Street, 7.15 p.m. I.E.E. North Lancashire Sub-Centre. Discussion on "Co-ordination of Overload Capacity," opened by H. G. Bell.

CARDIFF.—College of Technology, 6.45 p.m. Society of Instrument Technology, South Wales Section. Presidential address, "Electronic Computers in Relation to Process Control," by A. J. Young.

HALIFAX.—Crown Hotel, Horton Street, 7.30 p.m. A.S.E.E. Halifax Branch. "Electric Lifts," by C. Rhodes.

LONDON.—Savoy Place, W.C.2, 5.30 p.m. I.E.E. Radio & Telecommunication Section. "The B.B.C. Sound Broadcasting Service on Very-High Frequencies," by E. W. Hayes and H. Page.

1, Birdcage Walk, S.W.1, 6.45 p.m. Institution of Mechanical Engineers, Steam Group. Discussion on "The Draft Code of Practice for Steam Turbine Installations."

School of Hygiene & Tropical Medicine, Keppel Street, W.C.1, 6.30 p.m. British Institution of Radio Engineers, London Section. "Principles of the Light Amplifier and Allied Devices," by Dr. T. B. Tomlinson.

Grosvenor Hotel, S.W.1, 5.45 p.m. Engineers' Guild. Annual general meeting.

MANCHESTER. — Engineers' Club, Albert Square, 7 p.m. I.E.E. North-Western Graduate & Student Section. Film evening.

NEWCASTLE-UPON-TYNE. — Neville Hall, Westgate Road, 6 p.m. British Institution of Radio Engineers, North Eastern Section. "The Design and Application of Quartz Crystals," by R. A. Spears.

NORTHAMPTON. — College of Technology, 7.15 p.m. Northampton & District Electrical Association. "Signalling and Safety System on London's Underground."

NOTTINGHAM. — County Hotel, Theatre Square, 7 p.m. Incorporated Plant Engineers, East Midlands and Leicester Branches. "Electrical Installations—Should they be Officially Tested: If so, by Whom?" by L. A. B. Lowe.

SHEFFIELD.—Grand Hotel, 6.30 p.m. I.E.E. Sheffield Sub-Centre. "The Pimlico District Heating Undertaking—Costs and Financial Results," by B. Donkin, C. M. Johnston and E. Ockenden.

SUTTON COLDFIELD.—Town Hall. I.E.E. South Midland Graduate & Student Section. Annual joint dance.

WOLVERHAMPTON. — Technical College, Wulfruna Street, 7.15 p.m. British Institution of Radio Engineers, West Midlands Section. "Design of an Experimental Colour Television Receiver," by H. A. Fairhurst.

Thursday, 13th December

CARDIFF.—Institute Buildings, Park Place, 6 p.m. South Wales Institute of Engineers. "The Uranium Reactor and its Place in Power Generation," by H. G. Davey.

CHELMSFORD. — Crompton's Social Hall, 7.30 p.m. Chelmsford Engineering Society. "Developments in Aeronautical Radiocommunications and Navigational Aids," by L. A. Sweny.

DUNDEE.—Queen's College, 7 p.m. I.E.E. North Scotland Sub-Centre. "TRIDAC." (See Aberdeen, 12th December.)

GLASGOW.—39, Elmbank Crescent, 7 p.m. British Institution of Radio Engineers, Scottish Section. "The Design and Manufacture of Modern Capacitors," by J. H. Cozens.

LONDON.—Savoy Place, W.C.2, 5.30 p.m. I.E.E. Utilisation Section. Discussion on "The 13th Edition of the Wiring Regulations," opened by Forbes Jackson.

Prince of Wales Hotel, S.W.19, 8.30 p.m. A.S.E.E. South West London Branch. "A Pressing Problem," by L. A. Sharp.

NOTTINGHAM. — Trent Bridge Hotel. A.S.E.E. Nottingham Branch. Annual dinner.

SOUTHAMPTON.—Polygon Hotel, 7.30 p.m. I.E.E. Southern Centre. Annual dinner and dance.

SOUTHSEA.—Royal Beach Hotel, 8 p.m. A.S.E.E. Portsmouth Branch. "Southern Region Railway Electrification Programme," by W. J. Sykes.

SWANSEA. — S. Wales Electricity Board Showrooms, The Kingsway, 6 p.m. I.E.E. West Wales (Swansea) Sub-Centre. "Germanium and Silicon Power Rectifiers," by T. H. Kinman, G. A. Carrick, R. G. Hibberd and A. J. Blundell.

Friday, 14th December

BRISTOL.—Grand Hotel, 8 p.m. A.S.E.E. Bristol & West of England Branch. Film, "The 1956 Electrical Engineers' Exhibition," presented by P. A. Thorogood.

CARDIFF.—Angel Hotel, Westgate Street. A.S.E.E. South Wales Branch. Dinner.

CHELTENHAM. — North Gloucestershire Technical College, 7 p.m. British Institution of Radio Engineers, South Midlands Section. "Radio Astronomy," by R. L. Adgie.

CREWE.—Royal Hotel, 7.30 p.m. A.S.E.E. Stoke & Crewe Branch. "Railway Electrification," by I. Bagdzinski.

LEEDS.—Staff Refectory, The University, 8 p.m. I.E.E. North Midland Graduate & Student Section. Annual buffet dance.

LEICESTER.—College of Technology, 6.30 p.m. I.E.E. East Midland Centre. "A Transatlantic Telephone Cable," by Dr. M. J. Kelly, Sir Gordon Radley, G. W. Gilman and R. J. Halsey. (Joint meeting with the Leicester Association of Engineers.)

LONDON.—Savoy Place, W.C.2, 6 p.m. I.E.E. Education Discussion Circle. Discussion on "The Teaching of the Fundamentals of Transistor Circuits to Students of Electrical Engineering," opened by P. Godfrey.

Pepys House, 14, Rochester Row, S.W.1, 7.30 p.m. Junior Institution of Engineers. Inaugural meeting: Presidential address, "Fuel Economy and Combined Heat-Electric Generation," by B. Donkin.

Windsor Castle, S.W.1, 7 p.m. Electrical Trades' Commercial Travellers' Association. Smoker.

NEWCASTLE-UPON-TYNE. — Eldon Grill, Grey Street, 7.30 p.m. I.E.E. North Eastern Graduate & Student Section. Smoker.

NEWPORT.—Westgate Hotel. Institution of Heating & Ventilating Engineers, South Western Branch. Annual dinner.

Saturday, 15th December

OXFORD.—Regents Park College, Pusey Street, 6.30 p.m. A.S.E.E. Oxford, Reading & Districts Branch. "Industrial Electric Heating," by C. S. Whitby.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

CONTRACTS OPEN

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Australia. — Victorian Railways. 19th December. Lightning arrestors. (E.S.B. 29660/56. Ten/22869.)*

Birstall.—Parish Council. 12th January. Street lighting equipment. (See this issue.)

Canada.—Manitoba Hydro-Electric Board, Winnipeg. 8th January. Two steam generating units. (E.S.B. 29535/56. Ten/22953.)*

Chirk.—Ceiriog R.D.C. 21st December. Street lighting equipment. (See this issue.)

Dagenham.—Borough Council. 5th January. Electric lamps (Schedule 31) for the year commencing 1st April next. K. Lauder, town clerk, Civic Centre.

Ealing.—Borough Council. 2nd January. Street lighting equipment. (See this issue.)

Edinburgh.—North of Scotland Hydro-Electric Board. Double circuit 132 kV steel tower overhead transmission line between Kintore and Rothienorman. (See this issue.)

Ethiopia.—Imperial Board of Telecommunications. 2nd January. Automatic telephone exchange for Asmara. (E.S.B. 29754/56. Ten/22902.)*

Formosa.—Central Trust of China, Purchasing Department. 22nd December. Insulated cables and accessories. (E.S.B. 29652/56.I.C.A. Ten/22859.)*

Greece.—Ministry of Communications and Public Works, Civil Aviation, Athens. 19th December. 15,000ft of coaxial antenna cable. (E.S.B. 30111/56. Ten/22964.)*

India.—Madhya Pradesh Electricity Board. 15th December. 2,140 miles of conductors and accessories. (E.S.B. 29716/56. Ten/22884.)*

Director General of Supplies and Disposals. 19th December. Two electrically-driven pumping sets. (E.S.B. 29803/56. Ten/22888.)* 27th December. 250 kW electrode steam boiler. (E.S.B. 29576/56. Ten/22825.)* 4th January. Three electrically-driven sewage pumps. (E.S.B. 29575/56. Ten/22826.)* 11th January. One petrol-electric crane. (E.S.B. 30095/56. Ten/22951.)*

Ipswich.—Corporation. 7th January. Street lighting equipment. (See this issue.)

Korea.—Government Office of Supply. 19th December. Electric traction motors, portable welders and electrodes. (E.S.B. 29558/56.I.C.A. Ten/22857.)*

London.—Wandsworth Borough Council. 19th December. Two electric trucks. (See this issue.)

New Zealand.—General Post Office. 18th December. Valves. (E.S.B. 29591/56. Ten/22877.)*

Municipal Electricity Department, Christchurch. 17th January. Supervisory cable. (E.S.B. 29831/56. Ten/22897.)* Underground cable. (E.S.B. 29832/56. Ten/22898.)*

State Hydro-Electric Department, Wellington. 19th February. Two outdoor 30,000 kVA transformer banks with one spare unit for Central Park substation. (E.S.B. 29730/56. Ten/22889.)*

Pakistan.—Posts and Telegraphs Department. 24th December. High speed frequency shift equipment for radio links. (E.S.B. 29682/56. Ten/22890.)* 28th December. Multi-conductor carrier frequency cable. (E.S.B. 29810/56. Ten/22901.)*

* Specifications may be inspected at the Export Services Branch, Board of Trade, Lacon House, Theobald's Road, London, W.C.1 (Chancery 4411; extension 769).

Rhodesia and Nyasaland.—Federal Tender Board. 14th December. 38,000 electric lamps. (E.S.B. 29887/56. Ten/22924.)* 21st December. Steel cored copper wire. (E.S.B. 29884/56. Ten/22935.)* 4th January. Insulated copper wire. (E.S.B. 29882/56. Ten/22934.)* Outdoor telephone distribution wire. (E.S.B. 29883/56. Ten/22906.)*

Ruislip-Northwood.—U.D.C. 12th January. Electric lamps (Schedule 4) for the year commencing 1st April next. Surveyor, Council Offices, Northwood, Middlesex.

South Africa.—Union Tender and Supplies Board, Pretoria. 20th December. Electric petrol pumps. (E.S.B. 30265/56. Ten/22974.)*

Stores Department, South African Railways. 9th January. Pin type insulators. (E.S.B. 29700/56. Ten/22866.)*

Union Tender Board, Johannesburg. 11th January. Four electric furnaces. (E.S.B. 30143/56. Ten/22946.)*

Stafford.—Borough Council. 8th January. Electrically driven centrifugal pump for Baswich pumping station. T. H. Higson, borough surveyor, Mount Street.

United States.—Department of the Interior, Bonneville Power Administration. 12th December. Four 20,000 kVA transformers. (E.S.B. 29922/56. Ten/22937.)*

West Riding.—County Council. Electrical installation contractors who wish to be considered for inclusion in the Council's lists of selected contractors for electric lighting, heating and power installations should apply by 19th January. (See this issue.)

West Saltney.—Parish Council. 21st December. Street lighting equipment. (See this issue.)

WORK IN PROSPECT

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Ashington.—Additions, Ashington General Hospital, for Newcastle Hospital Board (£90,000); R. Carse and Son, Ltd., builders, Oldgate, Morpeth.

Houses (168), bungalows (28), shops (3) and rest centre near Ashington Mining School; M. Jameson, U.D.C. surveyor.

Basildon.—Erection of Moathouse E.S.N. School (£35,000); H. Conolly, county architect, County Hall, Chelmsford.

Birmingham.—Six-storey blocks of flats, Browning Street, houses (300) at Birchfield Road, Perry Barr, and houses on 76-acre site, Rubery, Hollymoor and Moneyhall, for House Building Committee; A. G. Sheppard Fidler, city architect.

Bromley.—Houses (73) on six sites; H. Cliffe, borough surveyor, Municipal Offices.

Cardiff.—Works and offices, Newport Road; Seymour & Co. (Cardiff), Ltd. Oxford Lane, Roath.

Carlisle.—Additional office accommodation at Crown Court (£30,000); J. H. Haughan, county architect, Portland Square.

Chester.—Workshops and offices, Sealand Road; Dutton & James, Ltd., City Road.

Dwellings (135), Newton Hall estate; Thomas Warrington & Sons, Ltd., Station Road, Ellesmere Port.

Crawley.—Hotel, Pound Hill; Whitbread & Co., Ltd., The Brewery, Chiswell Street, London, E. C.1.

Darlington.—Extensions to the Memorial Hospital (£2,500,000); Newcastle Regional Hospital Board, Dunira, Osborne Road, Newcastle.

Gosforth.—Houses (140) at Killingworth; Stephenson & Gillis, Saville Chambers, Newcastle-on-Tyne.

Hemel Hempstead. — Factory, Maxted Road; Valay Industries, Ltd., 186, Campden Hill Road, London, W.8.

Houses (163) on sites at Chasden Road, Cherry Orchard, Galley Hill and Howards Drive, for Development Corporation; G. B. S. Hindley, chief engineer, Westbrook Hay, Hemel Hempstead, Herts.

Heston.—Flats (20), off Church Road; J. K. Wakelin, architect, 4a, St. Albans Road, Watford.

Heywood.—Houses (150), Heady Hill; housing manager, 5, Church Street.

Kirkby.—St. Joseph's Junior R.C. School; F. Clark & Sons, Ltd., builders, 191, Heyworth Street, Liverpool.

Leicester.—Trading estate at South Wigston; Craven (Builders), Ltd., Saffron Lane, Leicester.

London.—Flats (89), Bush Road, Bermondsey; H. V. Ashley & Winton Newman, architects, 3, Verulam Buildings, W.C.1.

Showrooms and offices, Oxford Street and North Row, Mayfair; Tersons, Ltd., builders, 4, Dollis Park, N.3.

Morpeth.—Reconstruction of St. George's Hospital (£700,000) and extensions to Northgate Hospital (£1,500,000); Newcastle Regional Hospital Board, Dunira, Osborne Road, Newcastle.

Newcastle-on-Tyne. — Neuro-surgical and therapy departments (£825,000) for the General Hospital; P. H. Knighton, planning officer, "Dunira," Osborne Road.

Flats (104), Kenton North estate; city architect, 18, Cloth Market.

Preston.—Extensions to Preston Harris College of Further Education (£504,300); E. H. Stazicker, borough surveyor, Municipal Offices.

Richmond (Surrey).—Dwellings (100), Peldon Avenue; borough surveyor.

Shevington.—County secondary school; W. J. Bickerstaffe & Sons, Ltd., builders, Seven Stars Bridge, Wigan.

Slough.—Houses (266), Farnham Royal estate; E. Gardner Thorpe, borough engineer, Town Hall.

Stockton-on-Tees.—Houses (340) on the Hardwick estate; T. C. Hartley, borough architect, 28, The Square.

Tees-Side.—New hospital (£2,000,000); Newcastle Regional Hospital Board, Dunira, Osborne Road, Newcastle.

Thirsk.—Houses (42), Norby estate, for R.D.C.; Needham, Thorp & White, architects, 5, High Petergate, York.

Tynemouth.—Houses (98) at Murton Grange and Bolam Avenue, Marden; borough engineer, 16, Northumberland Square, North Shields.

Washington (Co. Durham).—Houses (98) on the Coach Road estate for U.D.C.; J. & T. Robson, Ltd., builders, Washington.

Wednesbury.—Extensions to County Commercial College (£300,000); director of education, Green Hall, Lichfield Road, Stafford.

West Bromwich.—Houses (55), Hateley Heath; borough surveyor, Town Hall.

West Hartlepool.—Houses (58); borough architect.

Willerby (Yorks).—County secondary school; county architect, County Hall, Beverley.

Wrexham.—Students' hostel, Wrexham Technical College (£50,000); Denbighs. county architect, Grove Park, Wrexham.